RAILROAD GAZETTE

FRIDAY, JANUARY 11, 1895.

CONTENTS

	PAGE
ILLUSTRATIONS:	
Portals of Howard Street Tunnel, Baltimore	18
A Machine for Trimming and Weeding Track	20
The Peckham Excelsior Motor Truck	21
CONTRIBUTIONS:	
Amber Lights	17
Mechanical Details of M. C. B. Coupler	17
Position Signals for Night Use	17
EDITORIALS:	
Rapid Transit in New York	22
The Movement of Freight in 1894	22
Passes in the State of New York	23
The Bulging of Fire Box Sheets	23
New York Railroad Commissioners' Report	21
Locomotive Counter-balancing	24
The Railroad Bond Market in December	25
EDITORIALS:	
The Nicaragua Canal	26
Editorial Notes	22,26
GENERAL NEWS:	
Locomotive Building	27
Car Building	27
Bridge Building	28
Meetings and Announcements	28
Personal	28
Elections and Appointments	29
Railroad Construction	29
General Railroad News	30
Traffic	30
MISCELLANEOUS:	
Technical	27
The Scrap Heap	27
A Report on European Boiler Practice	17
Some Points About the Scrap Pile	19
The Siberian Railroad	19
The Southern Railway Mortgage	20
Suggestions for Rapid Transit in New York	21

Contributions.

Amber Lights.

ST. LOUIS, January 2, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to a recent communication of Mr. A. H. Johnson about amber as a color for caution signals, and the appearance of amber-colored glass as seen in druggist's windows, the effect of this color as it would probably appear in signal lamps can be seen in this city on some of the cars of the Lindell Electric Street Railway Company. Four branches of this line converge near the central part of the city on Washington avenue. To aid the public in distinguishing the cars of the different branches while on this street a glass bull's eye about 7 in. in diameter is placed in the end of the clere story of the cars; the colors used are red, green, amber and white, and the illumination is by an incandescent lamp placed about 4 in. behind the bull's eye. It forms one of a series of ten 20 c. p. lamps used in lighting the car. The contrast between these colors and the white head light is very marked. The amber is easily distinguishable at distances up to about half a mile, and usually at greater distances, except in a few instances where the amber glass seems to be of too light a shade, showing a light which leaves one in doubt whether it is amber or white when more than about half a mile away. The proper shade of color seems to be of greater importance in amber than in red or green glasses.

E. A. HERMANN.

Mechanical Details of M. C. B. Couplers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My attention has been called to an article in your issue of Jan. 4, in regard to the mechanical details of M. C. B. couplers, and the remarks made by Mr. Barr at the December meeting of the Western Railway Club, in which he well said that in looking after the quality of the material, the mechanical construction of the coupler is being lost sight of.

In the first place simplicity of design and the smallest number of parts possible to perform the offices required are of the utmost importance, both to reduce the number of breakages and the amount of stock required to be carried for replacements.

Then too the lock should be a direct gravity lock supported by metal its whole length, parallel to the bearing of the tail of the knuckle when it is locked or coupled, and supported by it when the knuckle is ready for coupling. A lock of this description must always drop by its own weight the moment it is released and thus complete the coupling, no matter how fast the cars are thrown together.

Mr. Barr is also right in regard to any lock that swings forward and backward, whether it is pivoted vertically or horizontally. This can be proved by taking hold of the nose of the knuckle, closing as quickly as possible, and letting it rebound, when it will be found to swing open, nine times out of ten, before the lock drops to hold it. A lock of this kind is much more likely to uncouple than a direct gravity lock, especially on heavy grades where there is a steady pull it will creep back gradually and allow the cars to separate.

Any lock that is forced up by the tail of the knuckle striking it is also objectionable as it requires two motions before it performs its function. It will be found that a direct gravity lock is much better for passenger service as it requires no springs to keep it locked or coupled and will not uncouple. I was told by a prominent Superintendent of Motive Power within a few days of a case of uncoupling on his road on a car which had a coupler with a lock that swings backward and forward. The report of the inspector said it was caused by oil on the lock, which was no doubt put there to make it slide forward more promptly in coupling. A direct gravity lock requires no jaming or jaring of the cars in coupling, as they can be backed together as slow as it is possible to move the locomotive.

Mr. Barr is mistaken though when he says that there is no coupler that will remain uncoupled without pulling or pushing the handle of the rod over a shoulder to keep it unlocked when the switchman lifts it to uncouple. This is not necessary with the Thurmond' and when the cars separate it is ready for coupling without releasing the rod. It is also an advantage on the outside of a curve as the brakeman can uncouple, go off to signal his engineer and need not return to make ready for another coupling. Most of the connections between the lock and the uncoupling rod are broken by coupling with a link to the knuckle when it is open and the rod not released. As the connection is then necessarily tight it will be seen at once that as soon as the train stretches out the yielding of the drawbar spring will break the chain.

T. L. MCKEEN.

Position Signals for Night Use.

WEST BETHLEHEM, PA., Jan., 3, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I beg the privilege of adding a few comments to the discussion of the signal-light question.

There is greater need for a good signal by night than there is by day. The semaphore signal is concededly the best day-light signal in the world. Its characteristic of indicating safety or danger by its position, is the feature which commends it. After night-fall it loses this pecular effectiveness and becomes an ordinary color signal. In this form it is no better than thousands of other color signals, all of which are susceptible to serious objections.

Therefore, our present practice is deficient in the direction of our greatest need, and the situation ought to be reversed. If, however, it be impossible to accomplish this result with our present knowledge, then the night should at least be made equal to the day signal.

Exactly what form the future night signal will assume to meet this need, I am not just at present prepared to say, but I am fully satisfied that the mere changing of the color of the lights, as, for example, from red and white for home signals to red and green, or from green and white for distant signals to amber and green, will never fully meet the necessity; nor will such a change ever command the unanimity of sentiment that applies to the semaphore, which is, as before stated, admittedly *the* railroad signal; consequently, any change that falls short of the semaphore standard will prove a mere make-shift. So long as we rely on night signals of color, irrespective of position, no matter what the color, the subject will remain unsettled, and every semaphore erected will prove by inference a condemnation of color, alone.

The office of color in night fixed signals should be limited to identification—red to indicate home signals, and green, distant; and the position of these colors, horizontal or inclined, to indicate danger or otherwise, as in daylight practice.

I fail to understand the logic of a line of argument which extols the semaphore for day service and condemns position for night service. Such reasoning is fallacious and cannot be sustained. Still, one writer says: "I trust that by this time we have become fully alive to the necessity of giving up all attempts at shape and form." It may be that by "shape and form" he does not mean position. If he does include position, it would be interesting to know what possible objection can be urged against position at night when it is considered the *ne plus ultra* for day signals. He uses the word "necessity." If by this he means to convey the idea that position is necessarily rejected by reason of the fact that there is no night position signal available, I agree fully. Attempts to produce night position signals, some of them promising in theory, have heretofore been made, but I think it will appear later that these efforts were misdirected in some respect, and hence have proved unsuccessful; but I submit that that is no valid reason to cease our efforts and rush to the adoption of something that will at best only defer the matter, and that, too, at considerable additional cost.

The same writer admits in the same article that "there are dangers to be overcome even with the red and green standards." I do not quite agree with the quotation of the same writer, from Dr. Jeffries' lecture "form instead of color cannot be used for these purposes," if by form is meant position. Neither do I agree with the statement that "all attempts at shape are ridiculous, and arise solely from lack of knowledge." The Doctor can read the answer in the heavens in any of the shapes or forms of the various constellations.

The perfect night signal is coming, and I trust the committee will recommend that the change be deferred until the thorough airing of the subject brings some bright inventor to the front—whoever he may be—with a signal for night service that will at least be as good, if not better than the semaphore.

J. W. LATTIG.

An Interesting Report on European Locomotive Boilers.

The September (1894) *Bulletin* of the International Railroad Congress Commission contains a report on European locomotive boiler shells, fire-boxes, tubes, smoke-boxes and stacks, by M. Ed. Sauvage, one of the principal engineers of the Eastern Railroads of France. It is impossible to publish all of this comprehensive and interesting report in these columns, but the gist of it is given in what follows.

The report is divided into sections about as follows: Steel for boiler shells and fire-boxes, and tests for steel sheets; different forms and sizes of tubes, their effect on the capacity of the boiler and their location in the tube sheet; incrustation and systems of boiler feeding; the effect of the length of tubes and the smoke box arrangments for the production of steam. The valuable work done by the late M. Henry, Chief of the Mechanical Department of the Paris, Lyons & Mediterranean road, showing the effect of the length of the tubes, the fire brick and water arches, and the draught, on boiler capacity, is given in a condensed form in this report, and was given more in detail in the *Railroad Gazette*, July, 4, 1890. The results have since been published by Dunod & Vicq, Paris, 1894, as an extract from the *Annales des Mines* of August, 1894. It will repay those who are interested in the conditions which govern steam production in locomotive boilers to procure the complete work and read it. There are a number of plates giving data that are particularly useful to American locomotive designers.

Mr. Sauvage's report says that, although in the United States steel boilers and fire-boxes are universal, yet in Europe, while steel is frequently used for boiler shells, it is seldom used for fire-boxes, and that up to this time the experience with steel fire-boxes in Europe is confined within experimental limits, and they are not yet adopted for general use. Accompanying this report are numerous drawings showing boiler construction both with iron and steel shells, and with copper and steel fire-boxes. In general, the illustrations show the European practice with which all engineers are more or less familiar. One thing must impress the reader, with regard to these designs, is that no expense is spared to make the boilers strong and safe, and to hold the sheets so that there is no motion when the pressure changes.

There are given 27 European railroads that are using, or are experimenting with steel boiler shells, and it is said that there are others not mentioned in the list, and that no trouble has been experienced with steel shells, except on the Roumanian lines, where there have been some cracked sheets. These lines have 55 steel boiler shells in use at the present time.

In Europe only the softest quality of steel is generally used, and recently there has been a general reduction of the tensile strength, and there is an inclination to use still softer material. The inspection consists of tensile and elongation tests and physical examination by bending, prior to accepting the sheets. Phosphorous is reduced to the lowest practicable limit. In Austria the reduction of area of the test specimens at the point of rupture is taken in the place of elongation. The following table shows some of the more characteristic tests for shell steel used by European railroads.

The trials of steel fire-boxes in Europe have not been very successful, and there are now but few in service. The most extended experiences are those of the Paris, Lyons & Mediterranean and the Great Eastern road in England. The conclusions of M. Chabal, of the P., L. & M., from his study, is that if pure soft steel is used fire-boxes of that metal are safe. They should be carefully made, and sudden cooling should be avoided. The employment of steel is but very little more economical than copper, and the principal advantage of the steel box is the decreased weight. The report by M. Sauvage says that these opinions of M. Chabal cannot be taken as representing that of European engineers generally.

The report has much information about the various systems of placing tubes in European locomotives and about boiler bracing, smoke stacks and boxes, boiler scale, etc., which cannot be given here, but the whole is summed up in the following conclusion by M. Sauvage:

1st. The use of soft steel sheets for the shells of locomotive boilers is shown by current practice, and it is justified by the fact that these sheets are more uniform in quality than those of iron.

2d. The steel should be very soft, as shown by tensile strength which should not exceed 64,000 pounds per square inch, and should lie between 5,000 pounds and 57,000 pounds. The plates should come from the best raw materials, and be as free from phosphorous as possible.

3rd. The use of steel in the place of iron sometimes permits an increase of pressure without increasing the thickness.

4th. The manipulation of soft steel sheets does not require great precaution because they will stand local heating and bending. A desirable precaution is annealing the sheets after having worked them, and before riveting up. This is not always necessary where long experience has proved the constant quality of the material, and where the workmen are known to be reliable and accustomed to handling steel.

5th. Steel fire-boxes continue to be almost unused in Europe. Some trials have been made which do not indicate that they are much more economical in service than copper, at least not with the qualities of steel obtainable in Europe. However, with small locomotives having comparatively little work to do, steel fire-boxes may be very advantageous.

6th. Tubes of iron or steel are being more and more employed in the place of brass. This substitution may be made without inconvenience, and is a great economy.

7th. It is useless to solder an end section of copper on tubes of iron or steel. [This conclusion is the result of experience with iron and steel tubes that have had an end of copper about 6 inches long put on at the fire-box end, probably to increase the life of the flues.—EDITOR].

8th. The iron and steel tubes are rolled or expanded by a mandril in the holes in the tube sheets which are made cylindrical or slightly conical.

9th. The riveted over part or bead on the ends of the

tubes at the tube sheet, is not absolutely necessary or indispensable.

10th. The ferrules for the ends of the tubes should only be used on the fire-box end.

11th. Generally speaking, damage to the tubes can best be prevented by care in handling the boilers. When the tubes are correctly put in they will give no trouble when the firing is regular, and the entrance of the cold air to the fire-box is prevented as much as possible. Boilers should be cool before being emptied, and especially before washing with cold water. It is bad practice to draw the fires before entering stations, as this lets cold air into the fire-box and injures the tubes.

12th. Boiler compounds for reducing scale are useful for preventing hard deposits, but the composition must be selected to suit the local conditions and the nature of the water.

13th. Purification before using feed water that is rich in carbonate of lime, and above all, water containing selenites, is useful, but this plan requires a large outlay for apparatus, yet it often happens that the saving in fuel and boiler repairs and washing gives a final important economy.

14th. The introduction of the feed water into the steam space which rapidly removes the air from the water, and prevents local cooling of the plates, is worthy of trial.

15th. Locomotive tubes are generally not longer than 13 to 16½ ft., and this shows the bearing which the data from the boiler tests, given in the report, have on the boiler capacity of the boiler to generate steam.

16th. The area of the passage through the tubes ought to be as large as possible, and this justifies omitting the ferrules inside of the tubes at the ends. The diameter of tubes should not be too small, and they should not be brought too close together. The inside diameter should be from 1.6 to 2 in., and the distance between the tube holes in the sheets should not be less than .6 to .7 in.

17th. The tubes with wings on the interior, such as those of the Serve type for locomotives, have an outside diameter of 2.4 to 2.8 in., because tubes smaller than this are generally made in too short lengths. It is, perhaps, advantageous to substitute tubes with wings for the ordinary tubes of 2 in. in diameter, but in that case the number of wings, or the size, should be reduced.

18th. The relative efficiency of tubes arranged at the corners of a square, that is in vertical and horizontal rows, and those arranged at the corners of the square with one tube in the centre of the square, that is, in vertical rows, and not in rows horizontally, is about the same. Preference is generally given to the arrangement in both vertical and horizontal rows.

19th. It is not apparent that there is any particular difference in the capacity of boilers to generate steam, no matter what the metal of the tubes may be, that is, whether it is copper, iron or steel.

20th. The effect of the volume of the smoke-box is scarcely appreciable. The long smoke-boxes, such as are used in America, have been tried in Europe by many railroads, but do not seem to give better results than shorter boxes. It seems preferable to use the shorter box.

21st. It is not apparent that there is any marked superiority with any type of smokestack. The slightly conical form, wider at the top, seems to be preferred. It is well to prolong the stack into the interior of the smoke-box, using a funnel form for the interior. The height of the exhaust nozzle ought not to be much more than the upper row of tubes.

22d. Almost any form of spark arrester is, of course, an advantage in reducing sparks, but all interfere with the draft more or less, without being absolutely spark proof. The simple netting suffices in most cases.

23d. The annular exhaust nozzle seems to be the best, but it is complicated in design when the exhaust is made variable.

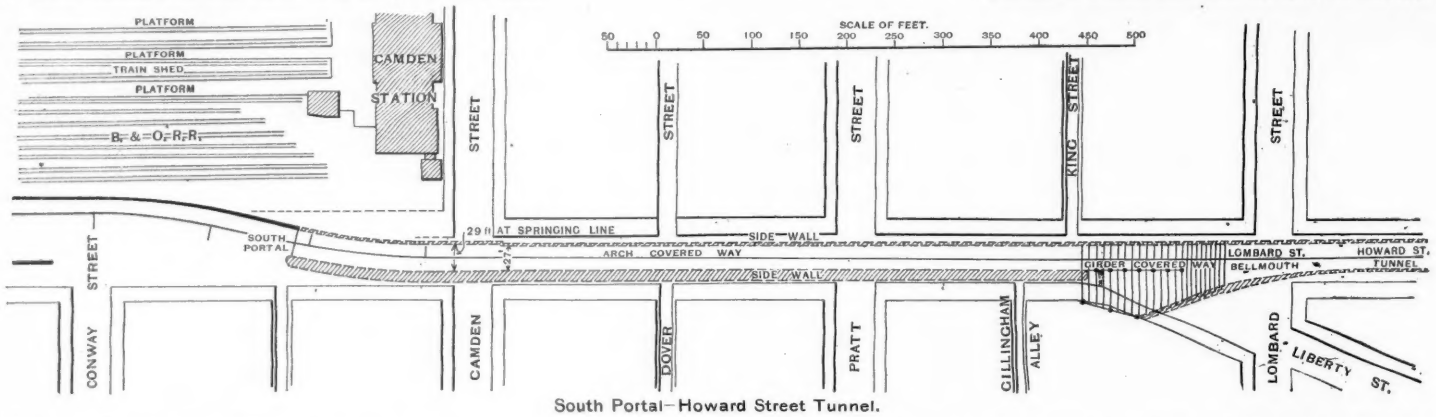
24th. The exhaust nozzle of single blast pipes should be variable, but it is best that the variation does not permit too much reduction in the size of the nozzle. No doubt it is on account of permiting too much reduction of the nozzle that the variable exhaust has been sometimes pronounced injurious or useless. The simple design of two movable wings seems all that is necessary.

25th. We refer here to the rule indicated in conclusion, No 21, regarding the height of the exhaust nozzle. It should not exceed much the top row of tubes, even when the stack is not prolonged into the smoke-box.

26th. The speed has no apparent influence on the production of steam. In other words, the quality of the weight of steam escaping per second with the same terminal pressure in the cylinders is the governing condition. The frequency of the blast has no particular effect. This is shown by the action of compound locomotives with two cylinders.

TABLE SHOWING THE GENERAL CHARACTERISTIC TESTS PRESCRIBED FOR STEEL SHEETS FOR EUROPEAN LOCOMOTIVE BOILER SHELLS:

ROAD.	Tensile strength, Lbs. per square in.	Elongation per cent.	Contraction of area at point of fracture. Per ct.	REMARKS.
Norwegian State	53 000 to 59,000	20 in 8 in.	.....	.....
Northwestern of Austria	54 000 to 62,000	.....	52	.....
Ausria—Hungary, State	50,000	.....	60	.....
King Ferdinand North	57,000 to 64,000	.....	50	Flange sheets.
" "	66 000 to 74,000	.....	37	Sheets not flanged.
St Gothard	49,000 to 54,000	25 in 8 in.	.....	Flanged sheets, tested both crosswise and lengthwise of rolling.
"	52,000 to 57,000	25 in 8 in.	.....	Sheets not flanged.
Jura-Simplon	52,000 to 59,000	26 21 in 8 in.	.....	.....
Mediterranean	54,000 to 60,000	30 28 in 8 in.	.....	Tested both crosswise and lengthwise of rolling.
Southern Adriatic	53 000 to 59,000	40 25 in 3 in.	.....	.....
London, Chatham & Dover	56 000 to 67 000	25 in 8 in.	.....	.....
Lancashire & Yorkshire	59,000 to 67,000	20 in 8 in.	.....	.....
North London	57.000	26 in 10 in.	.....	.....
Glasgow & Southwestern	56,000 to 67,000	25 in 8 in.	.....	Tested both crosswise and lengthwise of rolling.
Great Northern of Ireland	Drifting and bending tests only.	.....	.....	.....
North-Eastern	59,000 to 67,000	26 in 4 in.	.....	.....
Natal Government, and Great Indian Peninsula	61.000 to 69,000	25 in 6 in.	.....	.....
Western Railroads of France	64,000 to 72,000	25 in 4 in	.....	.....



South Portal—Howard Street Tunnel.

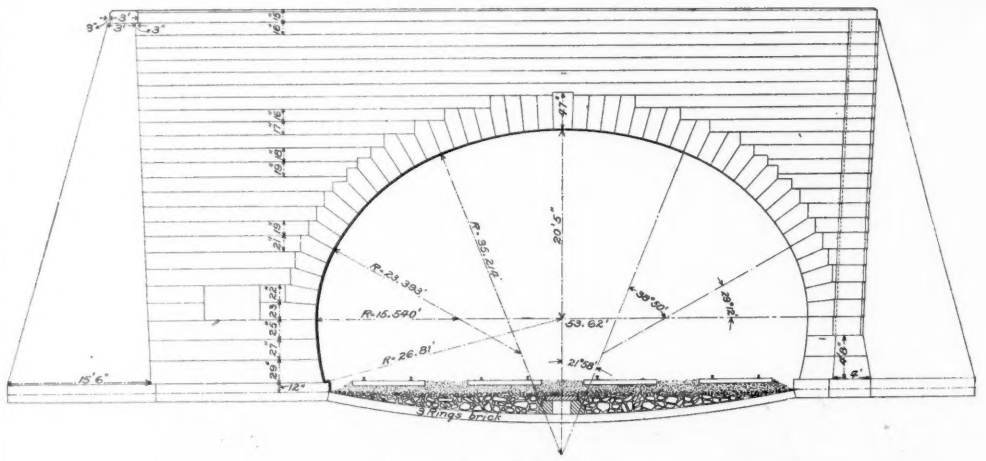
Portals of the Howard Street Tunnel, Baltimore.*

The north and south portals of the Howard street tunnel presented peculiar difficulties of construction and they are interesting features in the construction of the Baltimore Belt Railroad. At the south end the approach is a cut, starting in the B. & O. yard below Montgomery street, and running up nearly to Camden street, a distance of 0.25 mile. Room for four tracks is provided for in the cut, and two of them will enter the south portal of the tunnel near Camden street. The east wall of the cut stops near Conway street and provision is made for the two remaining tracks to deflect to the east and enter the lower end of the train shed of the proposed Lombard street station. The south portal has the same dimensions as the main shaft of the tunnel, namely 27 feet in width at the springing line and 22 feet high. The tunnel built on these dimensions extends northward 750 feet, the east side wall being especially strong to provide against injury when it is uncovered by the excavations for the new station.

Beginning at the north line of King street, a special form of construction was introduced to arrange for the entrance of trains from the station to the tunnel. The archway was abandoned for the distance of 150 feet, and the roof is horizontal, on girders. Stone abutments take the place of the east-side wall as center supports to the girders, following the line of the tunnel for 100 feet. At a point 60 feet north of the interrupted archway and the same distance east of the tunnel line, a heavy supporting wall begins, upon which the ends of the girders rest, the wall following the curve and being joined to the Lombard street bell-mouth of the tunnel. By means of the opening in the tunnel thus formed two tracks will lead from the proposed depot into the bell-mouth, switching into the two tunnel tracks above Lombard street.

The bell-mouth, which is joined to the girder work a few feet south of Lombard street, is 50 feet wide at the springing line. The flare of the shaft is produced by a short compound curve in the east wall, and the tunnel assumes normal proportions 125 feet from where it joins the girder-covered way.

Ultimately a large passenger station will be erected on the east side of Howard street for use in connection with the tunnel. The head house of this station will occupy the half square bounded by Lombard, Liberty, Howard and Pratt streets, and the train sheds and depot yard will extend southward to a point near Conway street. To accommodate the grade of the tunnel this station will be half above and half below ground. Entrance to the trains will be below, while waiting-rooms and the executive offices of the company will be above. Provision for traffic on Pratt, Camden and Conway streets will be made by means of steel bridges passing over the train shed and tracks below, the arrangement being quite similar to that in the northern part of the city, where several streets pass over Jones' Falls and the tracks of the Pennsylvania railroad. By this means Camden station can be utilized for freight business, while passenger traffic will be assigned to the Lombard street depot.



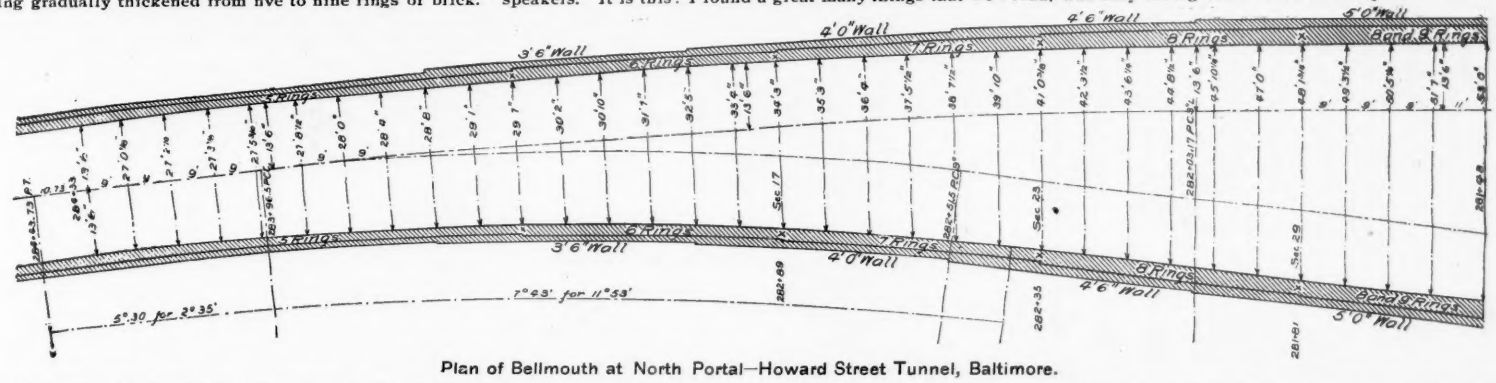
Brevard Street Portal.

The arrangement of tracks when the new station shall have been completed has not been worked out fully, but the general plan will be as follows: Freight trains will run over the two west tracks of the approach, will enter the south portal near Camden street and pass on up the tunnel, without being seen from the Lombard street station. Passenger trains will utilize the two east tracks in the cut, running into the station from the cut at Conway street. The station yard, perhaps, will have ten tracks, merging into two at the upper and lower ends respectively. The passenger trains will run from the station

* For a full description of this work see the *Railroad Gazette* December 14, 1894.

into the tunnel under the girder-covered way as above described

The north portal of the Howard street tunnel is also a bell-mouth. At Brevard street the underground shaft emerges into the Bolton cut on the east side of which the uptown station will stand. The tunnel was constructed with a mouth wide enough to accommodate four tracks, diverging from two at points 250 feet and 125 feet respectively, inside the tunnel. As at the Lombard street bell-mouth, the flare is produced by a compound curve in the east wall. The course of the west wall was not changed, it being simply strengthened by additional rings of brick as it approached the portal. By means of the curving east wall the tunnel is widened out from 27 feet at the springing line to 53 feet at the portal, the walls being gradually thickened from five to nine rings of brick.



Plan of Bellmouth at North Portal—Howard Street Tunnel, Baltimore.

The system of four tracks begun in this bell-mouth is maintained through the Bolton cut, beneath Mt. Royal avenue, across the curved bridge over Jones' Falls above North avenue, and around to the short tunnel above Huntington avenue. There the four tracks switch into two, and that arrangement is unchanged until the yard is reached at the Bay View Junction. This disposition of tracks will relieve traffic over the Belt Railroad by affording yard facilities near the middle of the line, at both entrances to the tunnel.

Some Points About the Scrap Pile.

The suggestive paper on "The Scrap Pile" read by Mr. J. N. Barr at the November meeting of the Western Railway Club, and published in our issue of December 7, was discussed at some length at the December meeting of the same club.

Mr. Wm. Forsyth (C. B. & Q.): The only part of this question I have been thinking about since the paper was read, was the cost of the scrap pile, so far as labor is concerned. I have noticed that, in accumulating scrap by the railroads, any effort to classify it and get it in shape for market, results in the scrap being handled quite a number of times, and I imagine that on some of it there is as much labor spent as will equal the value of the material.

On our road we attempt to keep rather a careful record of the breakages, and up to within a short time we have attempted to do it all at Aurora, but we found that the master mechanics did not report a great many things that broke, and that the record was not complete, and perhaps sometimes misleading. If we attempt to assume from our record that the things that are not reported there do not break, it is not the fact; and so in the coming year we expect to have each shop keep its own record, and then by an inspection of the record we expect to get at a closer knowledge of what parts of our engines and cars are too weak.

Mr. A. M. Waitt (L. S. & M. S.): It seems to me that the plan of handling the scrap at the works of the Chicago, Milwaukee & St. Paul Road is admirable in every respect. It is applicable more particularly to a road having one large central shop. Where you divide the scrap among five or six different shops, the outlay is considerable, especially situated as we are on the Lake Shore. If we desired to get room enough for the necessary compartments and bins for handling the scrap as it is handled at Milwaukee, it would be practically impossible at two of our main shops to do it. We have, during the past winter, had to handle scrap in a very expensive way, loading it in condemned box cars, carrying it ten or twenty miles and setting it off on a side track in the country where we had no fear of thieves, and leaving it there until such time as we had a market for it and could sell it. It would be practically impossible to carry out such a plan of disposing of scrap with such an enormous accumulation as we had up to within a few months, the accumulation of over a year.

I think there is apt to be, in using over scrap material, a lack of consideration of the real cost of handling such material. If roads are situated as ours is, with lack of space, convenient arrangements and tools for making scrap into useful material, it seems to me it is better to put it together and sell it with the least possible cost. We have adopted the practice of handling bolts as Mr. Barr suggests, using all the available round iron and sorting it into proper lengths, cutting them off and re-threading them, thus getting available bolts. It would not be practicable on our road to attempt the using of large iron and rolling it down. In the first place, the expense for a furnace of sufficient length to take in the iron that would have to be rolled down would be quite an objection, and I question very much on any other road if the figures will show that such a practice is feasible.

Mr. Barr (C. M. & St. P.): Mr. Forsyth has brought up the question as to the cost of handling and making over scrap. This is something that ought to be carefully watched. With a great many things the cost is certainly very much less than the cost of new material. Sometimes it is more. We thought that we might take our old Krupp tires and work them out into hand hammers. The steel was worth almost nothing; not more than one-half cent at best. So we put the idea into operation. Hand hammers cost $4.50 per dozen. We made several dozen hand hammers, and when we figured the cost up we found that the hammers so made cost us $8.98 a dozen.

As to the very large furnaces which are supposed to be necessary to roll 1¼" iron down to 1", etc., I do not see why we should not cut the iron and use medium size furnaces if it is more convenient. It is not necessary that we should build a furnace to heat the full length of truss rod to accomplish what I have proposed.

In the matter of handling nuts, we have made a step in advance since I wrote my paper on the subject. In that paper it was stated that the handling of nuts was not satisfactory. The trouble was in the labor involved in pressing the nuts. We have five bolt heading machines at our West Milwaukee shops. Since we have paid close attention to cutting up old bolts and utilizing them, three of these machines stand idle. Before this, the five machines furnished hardly enough bolts to meet requirements. One of these machines was taken and the levers were all removed which operate the dies, with the exception of the one plunger that upsets the head. The machine was so arranged that this plunger forces the nuts through a hole in a die and presses them to size just as fast as the boys can drop the nuts in position.

There is another point that close watching of the scrap pile brings out that seems to have been missed by the speakers. It is this: I found a great many things that we could sort out of the scrap pile that were perfectly good for further service. I had our general foreman and master mechanic go with me to the scrap pile. "Here," I said, "is a broken bolt with two nuts on it. There is no reason why this should be sent to West Milwaukee to have the nuts taken off. I want you to make arrangements on the road so that broken bolts with nuts on will be put in the inspector's shanty, and on a rainy day set to work and remove these nuts and use them." The result has been that the men all over the road are working to diminish the scrap pile at West Milwaukee, and the results of their labor is becoming very perceptible. I think there are a great many other items of this kind that should be handled on the road, but which are shoveled into the cars and shipped into, be disposed of in any way we may see fit.

Mr. Manchester (C. M. & St. P.): Mr. Barr referred to one of our failures in the handling of our scrape tire. We have succeeded in making such articles as spike nails, coal hammers for locomotives, lining bars, claw bars, and some classes of wrenches, and have made them at a profit out of scrap steel tire.

There is another class of scrap that is pretty hard to find a place to put, and that is coiled springs. Now, it is our practice when a coiled spring comes in with one of the coils broken—that is generally the way they come in—to put the good coil in a place assigned for that purpose, and when the next one comes in that has a good reverse coil, we put the two together and get a good spring. The steel scrap from the elliptic spring also occupies a very prominent place in the scrap pile, and for a long time we found it quite difficult to take care of it. We were stamping small wenches, spindle keys, equalizer fulcrum plates, and quite a variety of small articles out of the scrap spring steel, but the pile was constantly growing. However, a few months since we hit upon the plan of making our truck plates; that is, the plate that the slide rail of the switch slides on, from the scrap spring steel. We fixed up arrangements on our bulldozer, whereby the plate is sheared off, and two square holes punched in at one movement. The spring used has to be heated to a cherry red in order to handle it. We are making these plates at half a cent apiece. They are very satisfactory, and I think now that we can say we will keep up with the scrap pile, and perhaps a little more.

The old flues are a very ragged and bad looking article in the scrap pile, and not only that, they are awfully poor scrap. The junk men are always trying to jew us down, and only want to give us about enough to pay for handling the stuff into the cars. So we thought we would look around and see if we could not use up the old flues and save new material. It is our practice at all coaling stations, to have a cinder pit for cleaning out our front ends. These cinder pits have to have grating. We have of late been making these gratings from old flues. The reduction in cost of making them from the cost of new material is 50 per cent., and I believe we have got a little better grate, so far as giving long service is concerned, than the one which is made out of new material.

On all the old lines of our system the rails were originally held together by the old style fish-plate. Now, as this track is relaid, the angle bar is of steel, consequently the fish-plates go to the scrap pile. We have been converting these into rail braces. It costs to shear the plate to the proper length, and give it the proper form, a cent apiece.

We are also now welding our center-pins. When a center-pin breaks out on the road, it drops down on the track, and the section man carries it into his shanty, and when the rest of it gets to some car repair shop, the car repairer takes it out and puts in a new one, and in the course of time, the two pieces get together in the scrap pile, and finally reach us in West Milwaukee. We are welding these at a saving over new of 40 per cent.

We straighten all the crooked links and pins that do not show a sign of cracking, at a cost of half a cent apiece.

The remark was made that it was the practice in some shops to lay away material, waiting for a time when it would be useful, and it would become covered up, and when wanted for a purpose it never could be found. That carries out our theory. We have our scrap pile so arranged at West Milwaukee that all of our scrap material that is to be used in forging is laid out in alleys, in such a way that one class of iron and size of iron is put together, and I venture to say that a blacksmith in our shops could not get a new bar of iron out of the iron house when there was a piece of iron in this pile that would answer the purpose just as well; and that he will spend no more time looking for that piece of iron than if he went to the iron house and took it from the iron rack. Our blacksmith foreman and our iron house foreman have both got this scrap pile right under their eyes, and they know whether there is any material in that yard that is in proper shape to be forged into the article desired.

Then there is another feature in handling scrap. We do not make a practice of handling our scrap several times in order to get it to the desired point. We make such things as carrier irons, dead-wood plates, uncoupling levers, grab irons, etc., from material that comes in the scrap pile. Now, as a general thing, the order for the material does not come in at the same time that the scrap gets there; so to provide for that we have all of our scrap sheared up to the proper lengths for what it will make, and pile it away with the iron that is to be used up for that purpose. In that way we save any extra handling. When an article is to be made, the stuff to make it with is in its proper pile.

Mr. MacKenzie (N. Y. C. & St. L.): I was very much interested in the paper read by Mr. Barr, so much so that I collected quite a number of copies of the paper, and sent them over our line to quite a number of parties who are interested in the scrap pile. . . . This morning on our line we stopped at a railroad crossing rather early. One of the geniuses who works on the track, without knowing that the general superintendent is coming over the road, was busy taking out a bolt from a splice bar. We stopped there some little time, perhaps four minutes. He was working all that time trying to unscrew the nut. I don't know how long he had been there, or how long he was there after we left. You remember what Mr. Barr said about the ingenius trackmen that removed the bolts with the spike maul. When the man got out of sight I said to the traveling engineer, "I think I will send you another copy of Mr. Barr's paper on the scrap pile." He said: "I have been reading it. I guess that is the reason that the fellow is screwing it off. If it hadn't been for that he would have knocked it off with a hammer long ago." There is such a thing of carrying this idea too far. That fellow was probably earning ten cents an hour. I do not think he got the nut off in less than an hour, and after he got it off he probably had to rest awhile before he could go on. The nut was worthless.

Since that paper was read I find little places being put up to take care of a certain kind of scrap. I wanted to know where they got the time and the men to do this work, and they said, "Well, you sent us the paper, and said, 'Please note and see if you can make any improvements.'" And so you will see those places all over. We have a good system of collecting nuts. At intervals we have boxes to hold different kinds. They are brought down by a man connected with the scrap pile; in the evening he picks them all up, furnishing empty boxes for the next morning. The man fixing up a box car, if he sees fit to break off a nut, has to pick it up and put it in the box. There are many embankments and sink holes in our yards that if dug out would produce tons of iron.

Mr. Peck (C. & W. I. & Belt): One of the points Mr. Barr made, which I think is a good one, is having a good intelligent person in charge of the scrap. We have two of the largest scrap industries in Chicago located on our line, and it is surprising to note in their piles the number of new knuckles, draw bars, chains and everything of that description that have come in the scrap, evidently having been picked up on the road in a hurry, thrown into the car for scrap, and sold, tons and tons of it. I have offered to me, every day, all sorts of new things that have gotten in there by some oversight or through some person who did not know about it. I think there is more saving to be had in watching this careless scrapping than by working scrap over. If your shop is equipped with shears, etc., it is all right, but if you have to do the work by hand, as small shops do, I do not think it pays.

Mr. Rhodes (C. B. & Q.): The point Mr. Peck has brought up is interesting. He does not mention seeing any parts of locomotives in this scrap. The master mechanics watch their locomotives very carefully, and the material from the locomotives does not get into the scrap pile; and that brings up the question, why is it that other material which gets into the scrap pile is treated in a different way?

The Siberian Railroad.

The United States Consul-General at St. Petersburg in a report to the State Department at Washington gives some information about the Siberian Railroad, the western section of which from Tcheliabinsk to Omsk, 495 miles, has been recently opened for traffic. There is now an unbroken line of railroad from St. Petersburg to Omsk, 2,128 miles, the time between the two places being 4½ days. The railroad runs through the agricultural portion of Western Siberia, which is mostly a lowland with alluvial soil. The section is well-watered and well-timbered. The average temperature from May to October is about 60 degrees F. Passenger trains commmenced running over the completed portion on September 11, and freight trains on October 27. There are two trains a week to Omsk, one on Tuesday and one on Saturday. The trains haul only third and fourth class cars. The running time is a little over two days. There are 19 stations on the line, the average distance between them being 26 miles. The fare between two stations is 60 copecks,* (30 cents), third class, and 30 copecks, (15 cents), fourth class. One pood (36 lbs.) of baggage is carried free; for any excess 5¾ copecks (2.8 cents) is charged from one station to another.

The through fare from Tcheliabinsk to Omsk is 10.8 roubles† ($5.40) third class, and 5.4 roubles, ($2.70) fourth class. The greatest elevation is 185 ft. above the sea. The steepest descent is 1,800 ft. in 30 miles, on the Asiatic

* The Consul-General gives the value of the copeck as 5 mills.

† The rouble is valued in the Consul-General's report at 50 cents. The U. S. Treasury Department receives the rouble at 37½ cents.

slope. The mountain section, 200 miles long, has been constructed without tunnels at a cost of 87,000 roubles ($43,500) per mile, this being 15,000 roubles ($7,500) less than the original estimate. The iron bridges over the Tobol, Ishim, Irtish, and the Obi rivers will not be finished before the latter part of 1896. The trains now pass over wooden bridges, which must be removed before the ice breaks up in the Spring. An effort will be made next year to extend the line to Krasnoyarsk on the Upper Yenisei, 1,400 miles from Tcheliabinsk and 3,528 miles from St. Petersburg. It is expected that this western section will have a heavy traffic in wheat, the estimate being about 15,000,000 bushels a year. It will also have a heavy traffic in wool, hides and other animal products. About 1,500,000 poods (27,000 tons) are sent over the Ural Mountains annually, and this freight will be diverted to the railroad. An important item of through freight will be tea of which the railroad will carry 1,000,000 poods (1,800 tons) annually. A very complete description of the Siberian Railroad was given in the *Railroad Gazette* of Feb. 17, 1893.

A Machine for Trimming and Weeding Track.

The accompanying drawings and photographs show the construction and manner of using a machine which I have recently built for trimming and weeding the track on this railroad.

In the past, we have spent large sums of money in cutting grass and weeds on embankments, and having the road bed outside the ends of the ties present a creditable appearance. It has been customary to plow two or three furrows with a farm plow drawn by a pair of horses, the trackmen afterwards throwing the sods down the bank with forks.

For a long time I have thought that locomotive power should be applied to this work, and when on an inspection tour last summer one of my trackmasters suggested that plates be attached to the wings of a snow (wing) plow; but how or in what manner he had not considered. On returning I went to work with my foreman blacksmith and trackmaster here, on one of our wing plows, and in a short time turned out the machine here illustrated. Some slight changes were afterwards made as experience showed their necessity.

A cut can be made from 3 feet to 9½ feet outside the rail on both sides, to a depth of 2 feet below the top of the rail. The wings are so substantially built that they have been found fully able to withstand the tractive power of a locomotive having 18-inch clyinders.

The machine has gone over the whole line, and the trackmasters, as well as myself, are all highly pleased with the result. The greatest distance run in one day, keeping clear of all trains, was 26 miles, and the average for the whole line was 20 miles per day. Next year the cutting will be less and much better time can be made.

Four men are required—two to extend or close the wings and two to raise and lower the cutters. The wings are, of course, partly closed when passing bridges, narrow cuttings or beam culverts, and the cutters are raised at road crossings, switches, etc.

In a day the machine will do the work of 500 men, and do it uniformly and neatly, so that the track has the appearance of being newly ballasted. The drainage from the ballast and ties is perfect, and the work of putting in new ties is very much lessened.

It is only on single track roads, where the ballast is not first class, and where the traffic does not warrant a large track force, that such a machine would be valuable. A serviceable and cheap machine could be made by strengthening an ordinary box car and attaching wings to the sides.

P. S. ARCHIBALD,
Chief Engineer Inter-Colonial Railway of Canada.

The Southern Railway Mortgage.

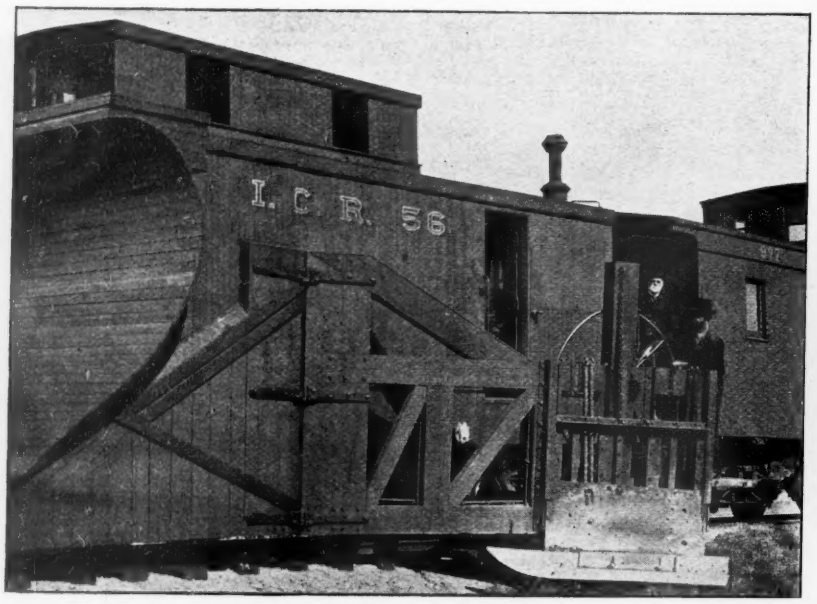
The new mortgage of the Southern Railway Company contains provisions never before embraced in a similar mortgage. As is well known, this company was formed to take over several properties mostly embraced in the West Point Terminal System, and having prior lien mortgages resting upon them to the extent of $69,000,000, as well as equipment notes and bonds to the extent of $3,000,000 more. These prior obligations are noted in the new mortgage, and a specific number of new bonds are set apart to provide for their payment. So far the new mortgage resembles system mortgages previously issued; but the provision for the substitution of new for old obligations has some new features. The trustee is not to certify the new bonds reserved for the payment of equipment notes until a certificate shall be signed by the president and treasurer setting forth the payment of such notes. All the underlying prior bonds, amounting to $69,00,000, must be paid on or before maturity. It is well known that blanket bonds have in some cases suffered by the extension of the underlying obligations at maturity, thus frustrating the hope of the holders of the system bonds that they would become first liens upon the property. On the other side it is to be said, however, that if the blanket bonds happen to be low in price at the time of the maturity of the senior mortgages the company loses just the amount of the discount. If, however, the total funded debt of the company is well within the minimum value of the property, as required by good financiering, the latter danger need not be considered.

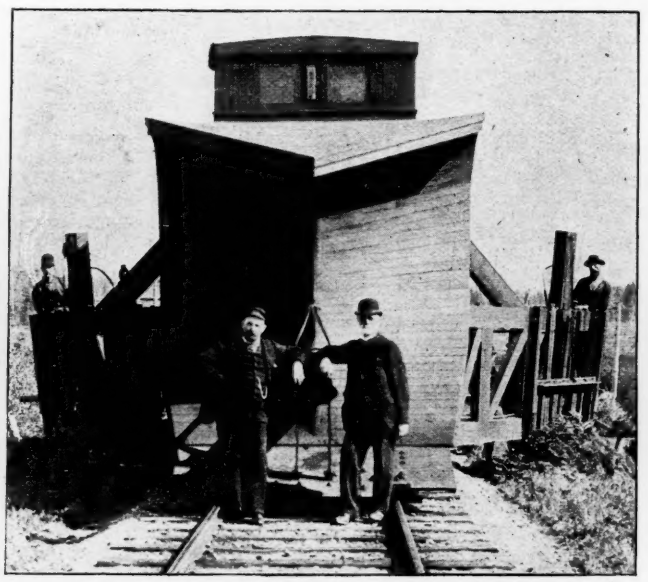
In the Southern Railway case $2,000,000 may be issued yearly for improvements, and the issue of these improvement bonds is carefully safeguarded. In the first place, a certificate from some one cognizant of the facts must be filled with the trustee, specifically indicating each and every new piece of work done or amount of bonds or stocks purchased; also certifying that the price paid in bonds or in proceeds of bonds was not in excess of the fair value of the work done, or that the bonds were sold at fair market values. If new property is acquired, all liens on such property must be stated, and in such cases equivalent bonds must be reserved. Such certificate must be accompanied by statements of the president and treasurer that they believe the certificate to be true, and that the expenditures made are not properly chargeable to operating expenses of replacement. This section also provides that no shares of subsidiary companies shall be purchased unless a majority of the stock is thereby acquired. The Southern Railway Company must not sell any bonds or shares in its treasury or hypothecate them; nor must there be any increase in the capital stock of any subsidiary company of which the Southern own a majority; nor must the bonds on such company be increased.

The provisions of this mortgage in case of a default are given at length. After six months' default the trustee may take possession of the property; at the option of 25 per cent. of the bonds outstanding, the trustee may declare the principal due; the trustee may sell the right, title, and interest of the bondholders under the mortgage, but in one lot; or upon written request of 25 per cent. of the bonds outstanding he must begin a suit to foreclose. The new Minneapolis & St. Louis mortgage gives this privilege to a majority. No individual holder of any Southern Railway bond shall have the right to institute a suit for foreclosure or for a receiver.

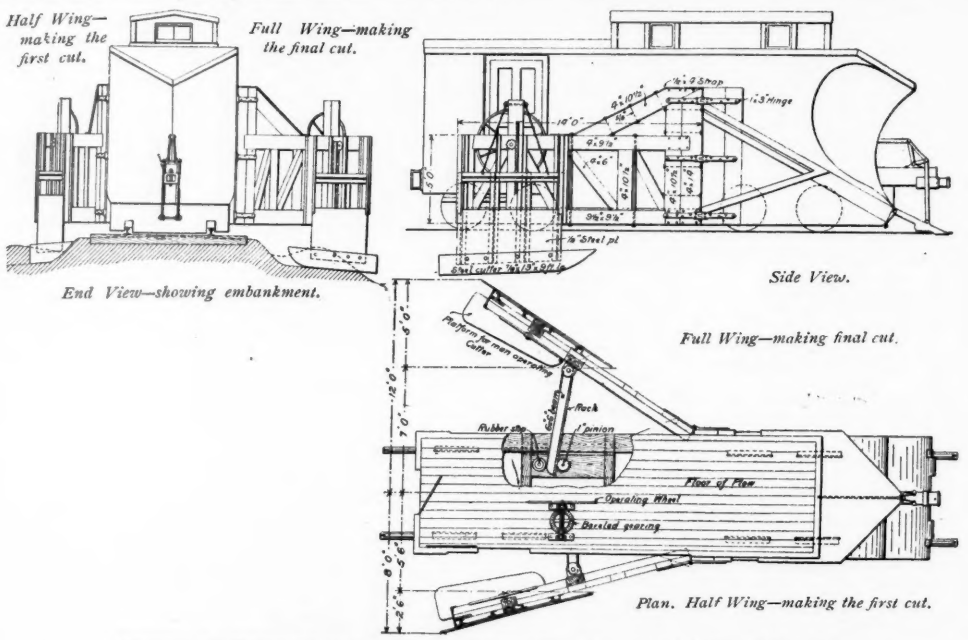
The holders of a majority of bonds shall have the right to control any proceedings for foreclosure or for the appointment of a receiver, or may discontinue such suit. Before full payment of bonds or whenever it shall be deemed expedient for their better security, although there may then be no default, the company may surrender its property to the trustee for any period fixed or indefinite. Upon filing a bill in equity or upon the commencement of any proceedings, the trustee shall be entitled to the appointment of the receiver, and in case a receiver is appointed upon the application of the company, the trustee shall receive all the income and profits. Registered holders of four-fifths of the bonds may direct the trustee to acquiesce in any plan of reorganization or to purchase the mortgaged premises at any sale, but that sale shall include the property as one parcel and as an entirety; the same proportion of bonds are also authorized to consent to the creation of new liens upon the mortgaged premises prior to the present bonds in case of reorganization.

In place of the usual provision stating that a trustee is not responsible for anything, the Southern Railway substitutes the provision that the trustee is not answerable for the misconduct of any agent selected with reasonable care, nor for anything in connection with this trust except misconduct or gross negligence. The trustee may also be removed by three-quarters of the bonds outstanding. This section will meet with the approval of the public. While the responsibilities of the trustee are limited, it is expressed and implied that such trustee is answerable for certain things such as gross negligence. What these words may mean in any particular case could only be decided by the courts. Instances are known where trustees, relying upon the loose language of a mortgage, have certified to issues of bonds largely in advance of the construction of new road. It is a question whether under the language of the Southern Railway mortgage its trustee would not be answerable for such a breach of business common sense. Rightly or wrongly, the community is inclined to hold trustees of important mortgages to a certain moral responsibility; and the evolution of trusteeship is certainly in the direction of making that moral responsibility more or less of a legal one.





Machine for Trimming and Weeding Right-of-Way—Intercolonial Railway of Canada.


Half Wing—making the first cut.
Full Wing—making the final cut.
End View—showing embankment.
Side View.
Full Wing—making final cut.
Plan. Half Wing—making the first cut.

Machine for Trimming and Weeding Right-of-Way—Intercolonial R'y of Canada.

Public interest will be attracted to the safeguards which are thrown around the use of reserved bonds and the care which has been taken to have the company receive full value for its issue of bonds in any case. The feature which gives the trustee first right to the appointment of receivers is in line with our latest experience. Friendly receiverships have come to be a business necessity in the cases of large corporations, because some one familiar with their operation must continue to have a share in their management; the present mortgage provides that such friendly appointments shall be made openly and not, as now, by stealth. The whole mortgage is worthy of study as affording the latest developments in the evolution of the railroad mortgage.—*Evening Post*, New York.

Suggestions for Rapid Transit in New York.

Two or three weeks ago a document was laid before the New York Rapid Transit Commissioners by Mr. J. J. R. Croes making certain suggestions for the consideration of that body. This was endorsed (as a suggestion) by half a dozen gentlemen eminent in business in the city. We give below considerable extracts from the document.

The essential condition of a rapid transit system in New York City is that all passenger transportation lines in the city must be tributary to a main line on which trains can be run at high speed, with a system of transfers. The lines to be built and owned by the city must be capable of adaptation to this essential condition, and, therefore, they ought to be auxiliary and supplemental to the existing surface and elevated railroads, and not antagonistic to and competitive with them.

To determine the location of a route which will provide for the accommodation of the maximum of passengers at the minimum of expense of construction and operation, there must be made an analysis of the present traffic, with reference to its sources and distribution.

Distribution of Traffic.—The hotel and shopping district, which comprises the mile and a half between Fourteenth and Forty-fourth streets, is the central district of traffic in New York City, and it furnishes 24 per cent. of all the long distance traffic. Out of every million passengers who travel more than two miles, 240,000 take the cars at some point within this district, and half of them go up town and half down town. The central axis of this traffic is on Broadway at Union Square, but above Fourteenth street is east of Broadway, and very nearly on the line of Madison avenue up to Fifty-ninth street. Through this central district there pass, without stopping, on their way between their homes and their business 35 per cent. of the long distance travelers. Of the 59 per cent. of the downward bound passengers who come down to and through this district, 23 come from west of Fifth avenue, and 36 from the east side. In the two and a half miles where crosstown communication is cut off by the park, the west side furnishes only ten passengers, to twenty-three who come from the east side. Of the up bound traffic, 59 per cent. come up and into, and through this central district.

Geography.—The points to be connected by a line on which an average speed of twenty miles an hour, including stops and transfers, can be maintained are: At the north—Manhattanville and the northwest suburbs, and Harlem and the northeast suburbs. At the centre—The Grand Central Depot, Madison Square, Union Square. At the south—The Brooklyn Bridge and Wall street, the Hudson River ferries. These conditions cannot be fulfilled by a forked route, with a single stem lying on the centre of Manhattan Island below Forty-second street, and two independent prongs extending northward. What is required is a route like the figure 8, or rather like the outline of a canoe paddle, the stem of the paddle lying near Fifth avenue, from Twelfth to Forty-second street, and the southerly blade bounded by Cooper Union and the Custom House on the east, and by Christopher street and Liberty street ferries on the west, and the northerly blade bounded by Broadway and Third avenue as far as the Harlem River at present, with provisions for its extension.

Transfers.—Until, and unless the entire system shall be operated by one corporation under municipal control, it cannot be expected or demanded that transfers from the lines of one corporation to those of another should be made without compensation. It is essential, however, that one fare should carry a passenger from any point in the city to any other point. It is worth considering whether this could not be arranged by providing that the corporation honoring a transfer ticket given by another corporation, should be permitted to turn that ticket into the city treasury at a stipulated value—say two cents—in liquidation of its annual stipend payable to the city.

Routes.—The determination of the problem of location involves consideration of questions of law, of finance and of mechanics which have not yet been thoroughly discussed. Among such questions are the following: Is it practicable to acquire for public use, under the right of eminent domain, a block of space, limited both horizontally and vertically, on payment to the owner of that space a compensation proportional to the value of the circumjacent space owned by him, for the purposes to which he applies such space?

If such condemnation is permissible, is it probable that a greater or less sum would be required to acquire the right to go below the cellars of houses than under a highway containing sewers, pipes and conduits of various kinds, with the rights appertaining to their use? In this connection there must be considered the fact that in traversing a mile of a New York avenue 320 separate properties have to be condemned, while in passing through blocks between two avenues, the acquisition of a mile of line will interfere with only forty separate owners.

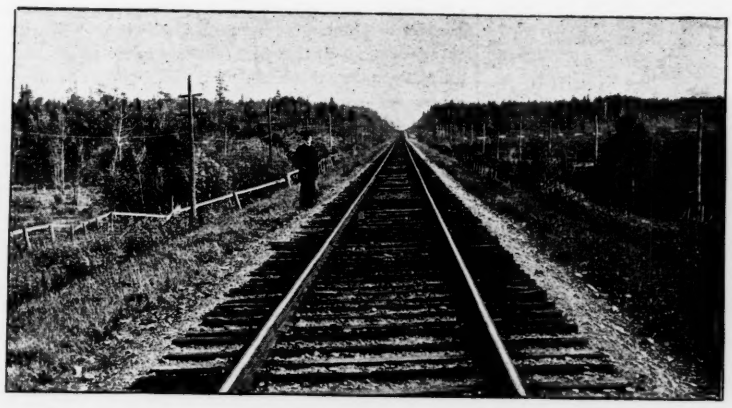
If such a block of space can be condemned above the surface of the ground, what would the probable limit of value of property be, to make the cost of such acquisition and of the erection of a railroad structure through it, greater than the cost of acquisition of an equal space under ground and the excavation and disposal of the material and the construction of a tunnel railroad, either under a street or under property occupied by buildings and yards. In this connection it is essential to any rational consideration of the subject that the sectional area of the space required for the passage of rapid transit trains below ground must not be reduced below what is considered desirable above ground. For the running of four separate tracks and their enclosing structure, not less than 900 square feet of section ought to be allowed, under any circumstances.

Whether the structures be underground or overhead, it is worth considering whether the location of a rapid transit route directly on the line of a main thoroughfare of the character of Broadway is desirable, as the concentration of masses of people in the vicinity of the stations would tend to increase the congestion of traffic and the difficulties of surface transit, where now the most relief from such congestion is needed, and moreover would necessitate the withdrawal from business occupation at each station of two ground floor frontages and twenty basement frontages, and besides would require the reconstruction of the sewer system on the whole route, the obstruction of traffic during the construction of the road, and the relaying of the cable railroad conduit.

In the localities where the throng of traffic is not excessive, and where the streets are lined with business houses rather than by residences, it is worth considering whether a neat and substantial steel viaduct in the centre of the street will or will not be less costly and less objectionable, both to travelers and property owners, than a subterranean tube.

In localities where residences predominate, it is worth considering whether the acquisition of 450 square feet of space at twenty feet or more above the surface of the ground and through the blocks, and the construction of an enclosed steel viaduct, with solid floor and deadened sides, and with bridges of good design across the streets, will or will not prove as costly of construction and as objectionable to both property owners and travelers as either a steel viaduct in the street, or an underground tube anywhere.

Mr. Croes then suggests a route to be occupied with a line, partly in tunnel, partly on viaducts on the streets, and partly on viaducts through the blocks, all being a development of the principles laid down in the suggestions printed above. For a development of the origin and distribution of traffic the reader is referred to the *Railroad Gazette* of Nov. 2, and for Mr. Croes' idea on the matter of right of way through the blocks to our issue of Nov. 16.

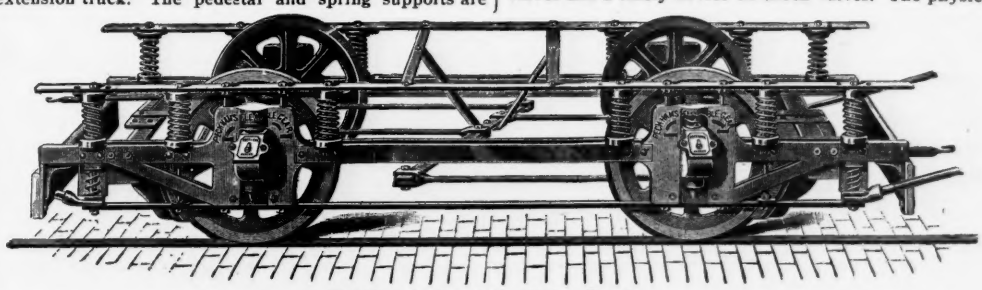


Before Dressing with Machine.

After Dressing with Machine.

Peckham's New "Excelsior" Truck.

The Peckham Motor Truck & Wheel Company is putting on the market a new truck designed by Mr. Peckham, to meet the requirements of certain roads that favor a cheaper construction than the all-steel, machine-fitted trucks. The new "Excelsior" trucks are constructed upon the same general principle as Peckham's cantilever extension truck. The pedestal and spring supports are cast in one piece and secured by hot-driven rivets, no bolts being used in its construction. It is provided with a steel top-frame, connecting the different springs. It is so constructed that it can be used as a "trailer" truck, as shown in the cut, or as a motor truck with all spiral springs, or as a motor truck with both spiral and end elliptic springs. Its yokes are provided with Peckham's flexible gear, which supports the truck frame upon the journal boxes by graduated spiral springs; it is also provided with Peckham's dust-tight, self-lubricating journal boxes, and with truss extension for open cars, when so desired. Although somewhat lower in price than the all-steel, machine-fitted trucks of this company, these trucks are made with the same care as to details.



Peckham's Excelsior Motor Truck.

New York Railroad Commissioners' Report.

The State Railroad Commissioners of New York, Samuel A. Beardsley, Michael Rickard and Alfred C. Chapin, have issued advance sheets of the 12th annual report of the Board. The opening chapter contains a review of the general business situation of the country, as it affects railroads, and the usual statisics from the reports made by the railroad companies are given. As these cover many hundred miles of railroad outside the State they are of no special value to the general reader. The length of railroad in the State of New York on June 30, 1894, was 7,992 miles, an increase of 104 miles over the previous year. The provisions of the new constitution affecting railroads are the prohibition of free passes to State officers, the abolition of the $5,000 limit to damages recoverable in cases of accidental death, and the restriction of the State Forest Preserve which will make it illegal henceforth to construct railroads on the lands embraced in that tract.

The Board has considered twelve cases referred to it by the Governor, fifty-three miscellaneous complaints, twenty applications for change of motive power on street railroads, four applications under section fifty-nine for permission to build steam railroads, and two applications for exemption as to equipment of freight cars with automatic couplers. There have been few complaints of over charges on freight. Complaints regarding fences along railroad lines continue numerous, and a change in the law is again recommended. There has been a slight decrease in the number of casualties to persons. Forty-eight passengers, 185 employees and 490 other persons were killed during the year ending June 30, and 223 passengers, 1,166 employees and 432 others were injured. Of the passengers 27 were killed in train accidents; 95 persons were killed and 95 injured at grade crossings. The previous recommendations of the Commissioners looking to the prohibition of new crossings of highway at grade and the abolition of existing crossings, are renewed, and a draft of a law is presented. This bill includes a section prohibiting the construction of an electric railroad across an existing steam railroad at grade. The number of trespassers killed on the track, 227, is about 13 per cent. larger than during the previous year.

The Commissioners believe that the equipment of freight cars with automatic couplers and air brakes has made better progress in New York than in any other State. Two persons have been killed and nine injured by catching their feet in frogs. The railroad companies, however, are observing the recommendations of the Board in regard to blocking frogs.

Various recommendations of previous years are renewed; that passenger cars be lighted by gas or electricity, that passenger cars be made stronger; that five useless draw bridges on the Hudson Division of the New York Central be abolished; that passenger cars have platform gate; that locomotives have mufflers on safety valves and a safety device on check valves. The physical condition of the railroads has been well maintained and in some cases improved. The forthcoming volume is to have a new map of the State.

A Station Indicator.

Last May we described briefly a station indicator that had been put in experimental use on the Metropolitan District Railway (underground) in London. It shows the name of the next station and rings a warning bell. We are told now that it has made more than one thousand journeys without a mistake.

RAILROAD GAZETTE

ESTABLISHED IN APRIL 1856.

Published Every Friday.

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contract for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The fate of the pooling bill in the Senate is still undecided, but Judge Patterson, the manager of the bill in the House, as well as all other friends of the measure, continue confident that it will pass the Senate without amendment. Nothing has occurred since the passage of the bill by the House to weaken its prospects, while various Boards of Trade and other bodies have passed resolutions favoring it. There has been some uneasiness lest the amendment restricting the power of the Interstate Commerce Commission, which was inserted somewhat mysteriously last spring, and which had to be expunged in December, in order to secure the passage of the bill in the House, might be again brought forward in the Senate, and thus lead to a disagreement between the two houses, if, indeed, it did not kill the bill at once; but the railroad company which is the reputed author of that amendment is now understood to be in favor of the passage of the bill as it came from the House, and as all other railroad interests have been united in favor of the law all along, the path of the bill in the Senate would seem to be smooth. The Senate Committee considered it on Tuesday of this week, but as Senator Cullom was at home mending his fences, and Interstate Commerce Commissioner Morrison made some suggestion about an amendent, the final reporting of the bill to the Senate was postponed to January 15.

Mr. Morrison's suggestion, as reported, seems rather hazy. He says that some people have got the notion that the Commissioners can prescribe the rates that are to be charged under a pool, and he wants an amendment added which will correct this delusion. But why should this be incorporated in the bill? If people do not understand its provisions, explain them. Mr. Morrison must know that a pool has no direct connection with making rates. It tends to make it impossible to make money by secretly reducing rates for a few large shippers, and thereby tends to stop such secret cutting, but it will neither raise nor lower the published rates. The Commission cannot regulate a pool before it goes into effect, because no one can tell until it has been in force some time what effect it will have. If it is fairly adjusted it will simply soften the relations between competitors so that they will conduct their contests decently and in order, instead of fighting like cats and dogs. If it does not divide the earnings between competitors with a very close approach to fairness, it will quickly go to pieces, and the situation will revert to the delightful state of irregularity that now prevails most of the time.

In a recent trip over another man's division a Division Superintendent took occasion to watch the working of labor-saving machines in some of the shops. He saw there comparatively light articles handled by cranes serving the various tools and noticed that the men frequently took a good deal more time to secure an article to the crane and so handle it than they would have taken to do the whole job by hand. This suggests the fact which came under our observation at the Paddington freight station of the Great Western Railway in London last winter. The installation of hydraulic cranes and the like in that station is old but pretty complete. All of the platforms are well served by these cranes. The men working in the station handle the freight by the piece; and, of course, it is their object to do it in the way in which they can do it quickest, not easiest. We observed that the power cranes were very little used, the men choosing to handle the articles by hand. They had discovered that they could make more money by letting the tools stand idle and doing a little harder work themselves. Of course these facts are not novel, but they are good ones for the men in charge of work to keep in mind in these days of the strictest economy. After all the economical results depend upon the vigilance and ability of the man in charge, and he must decide whether or not it would not pay the company to throw the labor saving appliances out of gear. And this suggests a point recently made by another division superintendent, that the superintendents themselves must take more responsibility as to whether or not additional labor is required at stations and other points, and whether or not cheap labor cannot do more of the work which is actually being done by expensive labor.

Rapid Transit in New York.

The proposition laid down by Mr. Croes, in the suggestions printed on another page, that all new rapid transit lines to be built in the city of New York should be auxiliary and supplemental to the existing surface and elevated railroads, and not antagonistic to them, and competitive to them, is sound. It is only by such harmony of design and operation that the maximum service can be got out of the transportation system of New York or any other great city. The greatest possible amount of accommodation for five cents will be had by a free transfer of passengers over the various parts of one system and between different systems, and by a free circulation of trains. If all the transportation lines, fast and slow, of the city were controlled by a common interest, this freedom of transfer would follow naturally, just as the reduction of fares on the elevated railroads from ten cents to five cents, in ordinary hours, came about. It would simply be a commercial matter and would be in the line of developing travel and getting the maximum work out of the plant.

The ideal solution of New York's rapid transit problem would be in the extension of the existing elevated railroad system. This extension would take the form of occupying some new streets, particularly to serve the ferries down town and wide regions up town. It would also involve junctions and crossings such that a train starting on the east side up town could finish its journey either on the east or west side down town, and similarly of a train starting from the west side up town. It would also involve better arrangement at the terminals so as to reduce the headway of trains, arrangements at some points by which trains would circulate continually around loops, and laying additional tracks on to which express trains could be switched, where the width of streets now occupied would permit such tracks. Probably it is only in this direction that it will be found possible to get returns on money invested in a line along West street for example, serving the ferries, and on other lines of comparatively thin traffic and yet of traffic enough to be worth considering. But any such development of the system seems now impossible owing chiefly to the mistaken policy of the directory of the Manhattan Company.

There appear to be very good reasons why elevated railroads in the streets cannot be built, at in from the down town region near enough to Broadway to make them profitable if run as a new and independent system; and so perhaps we must give up any notion of more elevated railroads down town for many years to come. If then a paying underground railroad is to be built, another combination of interests at once suggests itself. That is, that the underground system should be simply two express tracks running under the present cable roads; that the rapid transit business should be done on these tracks, and that the medium transit business should be done on the surface tracks, and that transfer tickets should be given so that for one fare a passenger could board a cable road at any convenient place and change to a fast train at the nearest quick station. Naturally, the Metropolitan Traction Company is the company to work out this solution; but from the little canvass of the subject that we have made with officers of that company, we doubt very much indeed if they would be willing to touch it.

We find that at least one member of the new Board of Experts has meditated away out of the present dilema on just this line, only he does not contemplate, we believe, the construction or ownership of the new underground road by the Metropolitan Traction Company; simply a traffic agreement for the transfer of passengers between the two. This involves an agreement on the part of the owners of the surface lines to make transfers, and this brings us to Mr. Croes' suggestion of a method of crediting transfer tickets to the various companies, which strikes us as novel and meritorious. At any rate, it is worth consideration. But this kind of combination must be voluntary we suppose, and whether or not the existing lines will be willing to enter into any such arrangement to exchange traffic with the new system we do not know.

We observe that Mr. Croes suggests that Lower Broadway is not the place for any new rapid transit line. Of course it cannot be occupied by an elevated structure, and we hope that such an invasion of the street will never be permitted. But if an underground line is to be built, we still hold that it ought to be under Broadway, or at least within a very few yards. If it is to pay fixed charges it must be where the traffic is, and it seems to us a mistake to suppose that a profitable traffic can be got away from the line of Broadway.

The Movement of Freight in 1894.

We give below a few statistics of the railroad traffic in important commodities for the calendar year just closed. To get at the results of this traffic to the roads, it is necessary to refer to the reports of earnings (which, as we showed three weeks ago, have slightly improved in the last four months), for rates, especially east of Chicago on eastbound low class freight, have probably afforded less profit during the past twelve months than for so long a period before for several years. Moreover, in the grain and cotton movements the year naturally begins when the new crop begins to move, which is not January 1; but as the annual retrospect in many other lines of business is made at this time, it may be well to compare a few notes in the traffic field.

The greatest unfavorable change has been in the grain movement. The receipts of flour and grain at the ten principal Western lake and river ports (including Peoria), for the last two calendar years were:

	1894.	1893.	Inc. or Dec.	P. c.
Flour, bbls., thousands.....	13,947	13,113	I. 834	6.4
Grain, bush., thousands.....	406,732	493,214	D. 86,482	17.5

The receipts at the seven principal Atlantic and Gulf seaports were:

	1894.	1893.	Inc. or dec.	P. c.
Flour, bbls., thousands.....	20,750	19,977	I. 773	3.9
Grain, bush., thousands.....	154,684	211,486	D. 56,802	26.9

A table printed in the New York *Journal of Commerce* shows that in flour and grain together, the Chicago roads lost, in their deliveries at that city: the Burlington, more than one-half, and the Chicago & Northwestern, and the Chicago, Milwaukee & St. Paul about one fourth each. The Alton, the Wabash, and two or three smaller roads had increases, but all the others lost heavily. The loss was worst in corn, and the Burlington is the greatest corn carrier.

The statistics of eastbound shipments from Chicago for the year, reported in the *Railroad Gazette* last week, were made up by the Board of Trade, and are said to be less accurate than the figures to be furnished later by the railroads; but in general they corroborate the results shown by the foregoing. The falling off was about 13 per cent. The Lake lines took out of Chicago only about two-thirds as much freight as in 1893. The boats suffered a great loss in corn, while the railroads had an increase which, so far as it was caused by the short crop of 1894 was doubtless natural; the scarcity affects the export trade first, and it is in that that the boats can easiest compete with the railroads. The deliveries to the large number of interior consuming points would furnish traffic in corn for the railroads long after the export trade might fail entirely.

The live stock movement, not included in the Chicago statistics referred to above, is given in a table printed in our traffic column to-day, which shows an increase of about 5 per cent. in receipts at Chicago, and of about 7 per cent. in shipments.

The shipments of freight westbound from New York City to and beyond Buffalo, Pittsburg, etc., for 1894, amounted to 1,335,970 tons (December aproximate), and for 1893 to 1,414,736, *showing a decrease of 78,766 tons. These totals include a great variety of merchandise, and this movement is a better index of the general condition of business than any other traffic report covering a large territory; but the loss up to October was greater than here appears, for there was a decided gain in November (about 30 per cent.). It is doubtful, however, whether much weight should be attached to this promise of prosperity; the December figures show a smaller increase and the January figures will be needed for an instructive comparison.

The great increase in the cotton crop has affected business only during the last four months, of course. For the twelve months, including the last eight months of the old crop year (in which about 30 per cent. of the old crop was reported), the receipts at the principal cotton ports were:

	1894.	1893.	Inc.	P. c.
Bales	6,983,359	6,733,955	249,404	3.7

Since September 1 the increase has been 24 per cent., and in Texas, where about one-fourth of the product originated, the increase over the same four months of 1893 was about 50 per cent. The *Financial Chronicle* finds that the average weight of bales this year is 506 lbs., as against 497 lbs. last year.

Passes in the State of New York.

The pass situation in the State of New York is showing some curious phases. One of the most recent appears in the case of the State Board of Railroad Commissioners. The Board and its employees have heretofore traveled on passes issued over the signature of the Secretary of State. The railroads have held that such passes could not be issued or honored under the new constitutional amendment prohibiting the acceptance or use of free passes by public officers of the State, and making it a misdemeanor to ask, to give, to accept, or to use such passes. The Board therefore brought suit in the Supreme Court of the State in the form of an application for a mandamus to require the Secretary of State to issue such transportation as he had theretofore issued for the commissioners and their employees. Last Friday Judge Parker, of the Supreme Court, sitting at Kingston, handed down his decision.

Briefly he says that the act of 1882 which created the Board of Railroad Commissioners assumed authority to assess upon the railroads of the State a sum not to exceed $50,000 a year to pay the salaries and necessary expenses of the Board of Commissioners, and by the same act it is provided that the actual and necessary cost of transportation upon railroads actually visited or inspected by the commissioners, etc., in the performance of their duties should be borne by the railroads so visited or inspected. To accomplish this the statute provides that the commissioners and their employees shall be transported over the several railroads in the State free of charge on passes signed by the Secretary of State. The judge rules that the constitutional prohibition is against the use by a public officer of free passes "for his own use or benefit." This phrase the judge interprets very strictly as expressing the intention of the framers of the provision to stop the giving of passes to public officers for their individual use and to save them from personal expense.

Construing the statute in the light of existing laws the judge rules that the constitutional provision prohibits public officers from accepting free passes for their own use or benefit, but does not prohibit them from accepting passes from the Secretary of State providing for their transportation while engaged in public business. He orders, therefore, a peremptory writ of mandamus and the commissioners will get their passes.

We confess to some astonishment at the attitude taken by the railroad commissioners. They exist for the double purpose of promoting good morals and sound practice among the railroad companies, and of promoting justice in the relations of the railroad companies to their patrons. One of the very best things that the commissioners could do is to sweep away all obscurity and sophistry in regard to the use of passes and bring the whole matter of the transportation of public officers and private individuals down to simple business methods that can be measured by simple business standards. To this end the railroad commissioners could do no one act so effective as to decline absolutely to travel at the expense of the railroads except when they are traveling on business which strictly concerns the railroads; and to give this practice its due effect it should be obvious to all concerned that the commissioners never travel free except on such business. This could be made obvious by their paying their fares, like any other passengers, from the current funds at their disposal, and then putting in vouchers which, when duly audited, would result in the money so spent being returned to them from the fund assessed upon the railroads. If, on the other hand, the commissioners carry in their pockets passes by which they can travel at any time over any railroad, whether those passes are signed by the Secretary of State or by the President of the railroad, who is to know that those passes are always used strictly for the public purposes of the State? Doubtless the honorable and high-minded gentlemen who compose the Railroad Commission would be very strict in paying their fares when traveling for private purposes; but doubtless there are a great many people in the railroad offices and outside who would suspect that the line was not always drawn rigidly. The moral influence of one method of getting transportation at the cost of the railroads would be good. The moral influence of the other method would be very bad.

But there is another aspect of the matter which is worth attention. The commissioners are now visiting Brooklyn for the purpose of investigating trolley railroad accidents in that city. This investigation may involve several journeys between Brooklyn and Albany. These journeys will be made over the New York Central & Hudson River Railroad, which has not the slightest concern in trolley accidents in Brooklyn. Thus the railroad is taxed for something for which it is not in the slightest degree responsible, and which is in no way any of its business. Such cases must arise all the time, the result of which is that the railroad which happens to be a great artery of travel to and from the State Capital furnishes free transportation to these State officers entirely out of proportion to the amount of business which they have to transact with regard to that railroad. It is very doubtful if any such scheme of unequal and arbitrary taxation is constitutional. If the matter were so serious that the railroads cared to take it into court and contest it, it is quite possible that this part of the law would be wiped off the statute books by the decision of the Court of Appeals of the State or the Supreme Court of the United States. On the other hand, by the method which we suggest, each railroad would be paid for the transportation which it furnished, and the fund from which this payment was made would be raised by an equitable and measurable scheme of assessment.

So far as the decision itself is concerned, we cannot but think Judge Parker has mistaken the spirit of the clause in the Constitution he has undertaken to construe. In a notable case Chief Justice Marshall laid down the principle that the framers of the Constitution and the people who adopted it must be understood to have employed words in their natural sense, and to have intended what they have said. Where the language is plain and unambiguous, there is nothing to be construed. To engraft upon simple language exceptions that exist only by implication is often to nullify the very purpose of the Constitution. And to limit its meaning by construction, when the words used are broad and unequivocal, finds no justification in the fact that certain existing customs would otherwise be overthrown.

When the Constitution says that no public officer shall directly or indirectly ask, demand, accept, receive or consent to receive for his own use or benefit, or for the use or benefit of another, any free pass from any person or corporation, or make use of the same himself or in conjunction with another, the language is plain and simple. It must be taken to mean what it says. Judge Parker, however, engrafts upon it an exception and allows a public officer to accept a free pass provided he uses it in the discharge of his official duties. We do not think that this is permissible or consistent with the purpose of the provision. Judge Parker justifies it by reference to the words "for his own use," which indicates, he thinks, a prohibition against a personal, and not an official, use. But a glance at the clause shows that these words are followed by the alternative "or for the use or benefit of another."

Taken together, the meaning is that a public officer shall not accept such a pass either for himself or for another, either for his own use or that of another. This becomes more clear, even, on reading the end of the clause where he is forbidden to "make use of the same himself or in conjunction with another." The antithesis is "either for his own use or that of another," "either he himself or another."

So far from this language allowing an exception of the kind Judge Parker imputes to it, we hold its meaning and purpose were to prevent and exclude that very exception. When a public officer is prohibited from using a pass himself or in conjunction with another it frittters away the meaning to hold that he is not thereby restricted in his official character; it is only in his official character that he is restricted at all. When he ceases to be a public officer he can accept and use as many free passes as he can get, so far as the Constitution is concerned.

The whole article in which this clause occurs is devoted to provisions against bribery of public officials in every conceivable form. It thunders against *official* corruption, not against personal and private corruption. That is provided against elsewhere, in instruments of less dignity and moment. With the awful revelations of the Lexow Committee before them, the people have stamped upon the organic law their disgust and hatred of this particular form of vice, which eats away all that is good in our public life. To render their action nugatory by judicial construction is not to be approved or tolerated, and it is to be hoped that the Attorney General of New York will not rest till the determination of the Court of last resort is had on the subject.

*The New York *Herald* reports that the business was distributed between the several trunk lines as follows: New York Central, 21.93 per cent.; Erie, 21.45; Delaware, Lackawanna & Western, 9.18; West Shore, 11.35; Pennsylvania, 16.86; Baltimore & Ohio, 5.91; Lehigh Valley, 11.26, and New York, Ontario & Western, 1.9.

The Bulging of Fire-Box Sheets.

One of the subjects, at least, that were given to a committee by the Master Mechanics' Association last year is worthy of the best effort of those who have it in hand. The work required of that committee is searching out the causes of the bulging of fire-box sheets at the fire line and a little above it. The effort in the past to learn the causes has been erratic and spasmodic, and little evidence of real value has been recorded. The evil is well known in its effects; it is a bulging of the sheets between the staybolts just above the fire, at a line such that there is every reason to believe that the water has always been above it in the boiler. In fact, this occurs in boilers where the water has never been so low as to cause the crown sheet to become abnormally hot. In boilers where it occurs it is not common to find the crown sheet at all affected, although the crown would be the first part to be affected if the water should get low in the boiler. The important fact is that the sheets bulge below the water line, near the fire, while those higher up in the boiler and farther from the fire do not bulge and are not apparently affected by the heat in any way.

The hottest place in a fire-box varies from time to time as the fire changes, but when the fire is in the best condition the hottest point is very near the fire, where the air rushes through between the lumps of fuel in just the right quantity to make nearly perfect combustion. The flame under such conditions has the appearance of a blow-pipe flame and is the hottest that can be made with any particular fuel. From this it is seen that the bulges take place at that part of the fire-box where the flame is likely to be the hottest when the conditions are favorable. The favorable conditions are most likely to exist when the engine is being pushed very hard and when the firing is heavy. If it could be shown that the fire could be made hot enough to drive the water from the sheets then one could conclude that the bulging is caused by the sheets becoming overheated and thus weakened so that the steam pressure bulged them out. This is a point of the main question that the committee can easily settle by a little experiment.

Many who know how locomotive fires are pushed when the men are behind and want to reach a terminal point on time, are quite ready to say that the water is at times driven away from the sheets by the fire itself because of its great heat; but they have no proof except such as is found in the fact that the sheets do bulge and in what they see in the fire-box when the firing is pushed hard. Now, when the unaccustomed eye looks into a fire-box, with a heavy fire, it sees nothing but dazzling flame; and if one looks very close and hard into the box he will lose the full use of his eyes for some days. But the accustomed eye of the old hand sees pretty well what is going on, and can look at the bed of the fire and tell its thickness and can see the sheets. Practiced men claim that they can see the sheets and can tell a hot crown sheet by difference in color, and the they say that at times, when the engine is being pushed, they can see a difference in color of the side sheets just above the fire. This difference in color they say is caused by the sheets becoming red hot. One travelling engineer of wide experience claims he has followed up cases where he has thought he has seen red hot side sheets, when the engine was being driven hard, and he has found that the sheets became bulged. It is not to be taken as a fact without further proof that any one has seen a red hot side sheet when the water was above the crown sheet, but it is a fact that they bulge, and there is no apparent reason for

or possibility of bulging unless the sheets get nearly red hot when there is a pressure on one side.

Several theories have been advanced by railroad men about the origin of bulged fire-box sheets, and it would take but little experiment to decide which theory is correct, and this the committee should do. It is well known that if oil is permitted to settle on a sheet over a fire it will soon become carbonized and form such an obstruction to the transmission of heat, from the plates to the water, that the sheet will get redhot and will be bulged out by the pressure; there have been many instances of this action. It is quite common, in cylindrical boilers used in stationary steam plants, where they have been neglected and the mud has been allowed to settle at the back and near the smoke-box, to find a bulge, sometimes having a depth of six inches with a diameter of fifteen inches, caused by the mud which prevents the water getting at the plates to keep them cool. Now this takes place, at a point behind the bridge wall and about ten feet away from the fire, where the heat is much less intense than over the fire.

There have been many instances in locomotive boiler practice where bulging has been caused so directly by the thickness of the scale deposits on the sheets that there can be no question as to the origin of the bulges in such cases. So, then, there are some cases where the causes are plain and well understood; but what bothers railroad men now is that they find these bulges near the fire on sheets where the scale is not over $\frac{1}{16}$ inch thick, and they are not satisfied that this thickness of scale is sufficient to retard the transmission of heat, from the sheets to the water, enough to permit the sheets to get overheated. Without looking into the matter experimentally far enough to learn just what the effect is of this comparatively small amount of scale, some have taken to speculation and not a few have let their theories rest on the results of speculation. Some hold that the circulation is bad in the water spaces round the fire-box, and that the bubbles of steam form against the sheet in sufficient size and number to keep the water away from the sheet and permit overheating. Others believe that the bulging is due to a weakening of the plate after it has been long used, and still others think that the bulges are the result of a gradual movement of the plates outward because of the pressure itself. Some think that the bulging is due to expansion and contraction, and again, that it is due to the curved shape of the sides of the box.

An important piece of evidence is that the sheets do not bulge in all boilers or in all parts of the same boiler where they are exposed to a very high temperature; also it is known that without heating the plates above the temperature of the stream, the pressure is not sufficient to cause a bulge even when continued for very long periods. Further, heat alone will not cause the bulging when there is no pressure on the plates, as can be seen from the experience with heaters and other apparatus used in boiler and smith-shops.

It is clear from this that it requires two things to make a bulge; first, an abnormally hot plate, and, second, a pressure to bend the plate. In a locomotive boiler the pressure is present and it only remains to find if there are causes and conditions which will give the other essential requirement for bulging, namely, the abnormally hot plate. This narrows the examination down to a test to show how much scale is required to permit the sheet to become overheated when the fire is as hot as it can be made with coal for fuel. If it should be found that the 3½ and 4 inch water spaces restrict the circulation so much as to permit the fire to drive the water away from the sheets by the rapid formation of steam, there is an easy remedy, for the circulation can be greatly increased by putting the feed water in just below the point where the bulging occurs. The circulation in a locomotive boiler is pretty rapid and it is not probable that defective circulation is the fundamental cause of bulging. If it is found on experiment that with a clean sheet it is impossible to get a bulged sheet, no matter how hot the fire with coal for fuel, the next step is to try different thicknesses of scale which may be put on the sheet in a short time by using water heavily charged with scale producing compounds. The apparatus to perform this experiment would be very easily built in the form of a section of a fire-box stayed with screw stays in the usual way. This could be made to form one side of a fire-brick furnace which could be driven by a blower. A section four feet square would be sufficient. There could be an inlet for the feed water and the steam could be passed out through a safety valve. There are a number of ways of performing this experiment which will no doubt suggest themselves to the committee if they undertake experimental research, which is probably, after all, the only way to settle the matter. Such apparatus as would probably be devised for this work would give an opportunity for the exmination of several conditions which most of us have assumed to exist in a locomotive boiler when the fires are hard driven.

Locomotive Counterbalancing.

A committee, consisting of Messrs. Sanderson, Pomeroy, Gentry and Gibbs, have presented to the Southern and Southwestern Railway Club a valuable report on the counterbalance of locomotives of which the following is a digest. The report is a long one and contains drawings of apparatus for counterbalancing that will be found useful to study and illustrations of pistons that are not clumsy, but instead are neat and scientific, which every draughtsman and designer of locomotives ought to incorporate among the facts he has laid away to form bases for new work. The report says that there are many builders and railroad men who follow rules for counterbalancing "that are manifestly wrong." The table *D* with this gives an analysis of the 19 rules for counterbalancing that the committee gathered. A study of this table is, of itself, enough to show the rules to be sadly in error and that there is a carelessness in counterbalancing that is inexcusable.

TABLE D.

(A) No. of Rule.	(B) Per cent. of weight of main rod to be taken as reciprocating weight.	(C) Per cent. of total weight of reciprocating part to be balanced in main wheel for two-coupled locomotives.	(D) Per cent. of total reciprocating parts to be balanced in rear wheel.	Remarks.
1	50	50	50	
2	..	44	22	This rule only balances ⅔ of revolving parts.
3	..	40	40	
4	..	33	33	
5	33	33 37.5	33 37.5	When reciprocating parts are light. When reciprocating parts are heavy.
6*	..	..	..	
7	†	33	33	
8	..	100	none	
9	50	66	none	
0	33	50	50	
11	..	50 100	none none	Light engines Heavy engines.
12	33	33	33	
13	50	33	33	
14	† †	50 33	none none	Passenger engines. Freight engines.
15	50	50	50	
16	..	50	50	
17	..	50	50	Approximate.
18	..	50	50	Approximate.
19	..	50	50	Approximate.

*Balance until engine rides smoothly and use no counterbalance for freight engines.
†Weight of front end of main rod when resting on scales.

The report says that these rules have been extensively used in this country and in Europe," and in this great diversity together with the errors of the application of the rules, can be found the reason why some roads have had to reduce the excessive counterbalance in their locomotives to keep them from damaging the track, others have had to add more counterbalance to their engines to keep the cab from being shaken off." The report gives some interesting history of the progress of the study of counterbalancing from the records of engineering literature.

The committee has in its investigations entered upon the question of the tendency of a body to revolve on its center of gravity and while they do not say so, in as many words, yet they intimate that there is no such tendency, when a body is rotating around a center which is not the center of gravity. A model was constructed to show this; it did show that under the conditions in which it was operated there was no apparent tendency for the center of gravity to move in and coincide with the center of rotation. This is a subject that is not properly presented in books on mechanics and a good many have been led astray in considering it. A quite complete analysis of it is found in Professor Webb's Appendix to a paper on Rail Pressures and Locomotive Counterbalancing, by Mr. Barnes, before the American Society of Mechanical Engineers at the last meeting. Roughly speaking, it may be said that it is all a question of the rigidity of the supports and the centrifugal force due to the speed of revolution. With flexible supports and a high velocity of rotation, a body will revolve on its center of gravity if it turns fast enough, but with theoretically rigid supports it could never revolve on its center of gravity if that center did not coincide with the center of rotation. If the supports are flexible and truly elastic to and fro in *one* direction, the path of the center of gravity will be an ellipse. If the supports are equally flexible and elastic in all directions the path of the center of gravity will be a circle whose diameter will increase as the speed increases up to a certain point, which may be termed the "critical" velocity, and after that the diameter will decrease as the speed increases, and when the speed is infinite the body will revolve on its center of gravity and the center of rotation will move in a circle around the center of gravity. Professor Webb's explanation is probably the only one in print. The apparatus which the committee has used will show all this if the wheel or revolving body have sufficient velocity.

The conclusions of the committee are logical and correspond very closely with those of Professor Goss and Mr. Barnes in their papers before the American Society of Mechanical Engineers. Conclusion 7th will give designers of compound locomotives something to think about:

"1st. Each wheel should be balanced correctly for all the revolving weights attached to it.

"2d. The main rod should be considered as one-half revolving and one-half reciprocating weight when over eight feet long; if under this it should be considered as 6-10 revolving and 4-10 reciprocating weight.

"3d. The part of the weight of the main rod considered as revolving weight should be entirely balanced in the main wheel.

"4th. The amount of over balance to be applied to the drivers to balance the reciprocating weights should be equaly divided between all the driving wheels.

"5th. For modern, heavy, well designed locomotives, with comparatively light reciprocating parts, provide counter balance for fifty per cent. of the reciprocating weights.

"6th. For lighter engines, that are less able to withstand strains, and absorb the disturbances caused by heavy reciprocating parts, or for such as have very short wheel base and long overhang, balance up to sixty-six per cent. of the reciprocating weights.

"7th. For compound engine, with large pistons and excessively heavy reciprocating parts, balance up to seventy-five per cent. of the reciprocating parts.

"8th. The center of gravity of the counter balance weight must be opposite the crank.

"9th. The counter balance should be brought out from the face of the wheel as far as due clearance for the rods and good design of wheel will permit.

"10th. The center of gravity of the counter weight should be placed as near the rim as possible, and the bulk of the counter balance made as small as possible. This can be accomplished by the use of lead filling, and by making the counter weights as per Figure A, rather than as per Figure B.

"11th. If, on account of the smallness of the wheels, sufficient counter balance, according to the rules given above cannot be placed in the main wheels, then add up to fifty pounds to the weight in each of the other wheels to help balance the right amount of the reciprocating weights, but the excess should in no case exceed this amount.

"12th. Make the reciprocating parts as light as possible."

There is a grain of sarcasm in one of the concluding paragraphs of the Committee's report. Evidently one or more members of that committee feel they have been bulldozed into accepting a sort of counter balance that did not agree with their convictions as to what was best. The paragraph is as follows:

"Your committee has gone into the subject at length, and it is to be hoped has presented it from all sides so clearly that club members can decide what should be the proper conditions of counter balance for each class of locomotives in their charge, and can go to the locomotive builders with a feeling of confidence, and specify that new locomotives shall be counter balanced thus and so, regardless of the protestations that the firm has built thousands of locomotives which are running all over the country and giving the best kind of satisfaction, according to their own formula, and regardless of the pointed insinuations that any one who does not agree with them does not understand what he is talking about."

The report gives a table *C* that will indicate to those who have charge of permanent way, how necessary it is to keep an eye on the mechanical department in the matter

TABLE C.—COMPARATIVE WEIGHTS OF RECIPROCATING PARTS OF MODERN LOCOMOTIVES.

	CLASS.	Diam. of cylinder in inches.	Weight of one piston and head. Lbs.	Weight of one piston rod. Lbs.	Weight of one cross head. Lbs.	Total wgt. of recip. parts on one side in Lbs.	Total wgt. main rod in Lbs.	Boiler pressure Lbs. per square inc	A.	B.
	N & W "T"	*14	116	170 s	.....	....	....	180	....	....
E	L & N W Ry	15	67 w i	88 s	152 A cs	307	....	180	....	....
	N & W "O"	16	153 c i	69 w i	131 B c i	353	240 w i	140	18,300	14,900
	N & W "Q"	17	182 c i	83 w i	129 B c i	394	272 w i	140	20,500	16,700
E	L & S W	17½	133 c i	126 s	255 D w i & c i	514	...	....	....	....
	N & W "K"	18	192 c i	83 s	188 B c i	463	328 w i	140	24,300	19,800
E	M S & L Ry	18	144 c s	72 s	120 B c s c i	336	....	....	....	....
	B & O Cole	18	139 c s	90½ s	93 B c s	322½	....	....	....	....
	P R R "P"	19	186 c s c i	98 s	148 3 bar	432	311 f s	175	22,800	18,600
	Schenectady B & A	19	174 g i	130 s	202 4 bar s	506	422 f s	180	27,700	22,500
E	G W Ry	19	207 c i	168 w i	138 B c s	513	....	....	....	....
	N & W "H"	19	185 c i	95 s	160 B c s	430	363 w i	140	23,600	19,500
E	N E Ry	19	155 c s	131 s	155 B c s	441	446	....	25,700	21,400
	N & W "C"	19	202 c i	98 s	175 B c s	475	350 w i	140	25,200	20,500
	N & W "D"	19	202 c i	96 s	150 B c s	448	....	155	....	....
E	L & S W	19	142 c s	178 s ex	240 D c s & c i	560	....	....	....	....
	N & W "G"	20 b	250 c i	104 s	182 C c s & i	536	351 f s *	150	27,500	22,500
	N & W "I"	20	250 c i	104 s	215 D c s	569	518 w i*	145	32,000	26,500
	L & N	21	351 c i	126	277 D	754	375	....	36,500	28,200
	N & W "T"	*14	116 c i	170 s	317 E c s	1153	620 S *	180	56,800	45,500
	N & W	24	320 c s	230 s ex						
	Rog. Com.	29	430 c i	....	.....	....	....	....	....	....
E	L & N W Com	30	288 c s	....	.....	....	....	....	....	....
	Rd L W	31	387.5 c s	....	.....	....	....	....	....	....

STYLES OF CROSS HEADS.—A, Webb style, two bar; B, four bar; C, two bar; D, Laird; E, Vauclain, four bar; "E" English engines.

* These three rods are all same length and for same powered engine.

NOTES.—Materials—Cast Iron, c i; Cast Steel, c s; Wrought Iron, w i; Fluted Steel, f s; Steel, s. Gun Iron g. i.

of counter balancing. This statement of ours, of course, makes the innocent suffer with the guilty; that is, it is a criticism of the whole collection of locomotives running in this country and is unjust to the extent that it is unfair to intimate that all designers and builders of locomotives need watching to prevent the use of an unnecessary amount of counter balance for reciprocating parts, there being in a majority of cases, no more counter balance used than is necessary and not enough to damage the track at reasonable speeds. The diameters of the wheels are not given, but there is no reason to suppose that the weights of the reciprocating parts given would not be found on locomotives with five-foot drivers, and it is not uncommon to run an engine with five-foot driver at 60 miles an hour. Believing these conditions to be possible in most cases and to be actual in many cases, we have added the column *A* to table *C* to show the centrifugal forces of the excess counter balances used for reciprocating parts, when all of the reciprocating weight, including one-half of the main rod is counter balanced, and equally divided between two pairs of drivers, which is the plan outlined in six of the various common rules given in the report. The next column, *B*, gives the centrifugal force when the 66 per cent. of the reciprocating weight, including one-half the main rod, is balanced as recommended by the committee in conclusions 2d and 7th. These rules were selected from the others because they give the maximum centrifugal force that is permitted by the conlusions of the committee.

Before the extra copies of the report of this committee are exhausted and out of print those who are interested should write to the Secretary to obtain one, as it makes a valuable addition to the literature on the subject.

The Railroad Bond Market in December.

There was less activity in railroad bonds during December than in either October or November, although the average volume of transactions was fair; the average net changes were light as compared with November. The check in the demand for government bonds, caused by Secretary Carlisle's currency reform bill, naturally affected the market for gilt edged railroad issues by diminishing the demand. The bankers' syndicate which took the fifty million issue of bonds, at 117.077 placed them on the market at 118½, and later at 119½. They were in good demand and went rapidly up to the time of the introduction of the bill, which caused a drop of one point in the price. This led to the abandonment of the syndicate and the publication of a very pointed letter by Drexel, Morgan & Co., stating that 35 per cent. of the issue had been sold, and the balance divided among the members of the syndicate, and hinting that any further bond issues would meet with a very chilly reception in New York. The bonds sold, January 3, at 116½.

The stock market declined steadily during the month, and established pratically the lowest prices of the year; but the depreciation was not accompanied by any important liquidation; consequently it had but little effect upon the bond market, or at least that portion of it which is removed from speculative influences. There was very little disposition in the last two weeks of the month toward investments of any description; less than usual, in fact, owing to the unprofitable twelve months, and the unsettled condition of currency matters.

In considerating the movement in bond prices during December, by groups, it will be seen by the accompanying table that the only one which declined is that comprising the receivership roads. The others advanced on average of .45 per cent.

Receivership group declined	.45
Granger group advanced	.40
Trunk line group advanced	.40
Southwestern group advanced	.60
Trans-continental group advanced	.41
Coalers advanced	.50
Southern advanced	.66
Miscellaneous advanced	1.38
Combined list advanced	.06

The receivership issues were most irregular, reflecting the various ups and downs of the reorganization movement. This has taken a turn unfavorable to the junior security holders. The failure of the Atchison Committee to reorganize by imposing the burden chiefly upon the stock, and the confession of the Reading Committee, made in the last day of the year, that their plan was a failure as far as it applies to the incomes and the stock, and that it will be abandoned respecting those securities with a view of assessing them heavily later on, rendered them exceedingly weak, and furnished no comfort to owners of securities of other insolvent roads similarly situated. Hence the first incomes declined a net 6½; the seconds 4⅜, and the thirds 3¼ points. The Erie group is another which suffered on account of a change in reorganization methods, necessitated by bad earnings. Early in December it was announced by Drexel Morgan & Co., that the heavy deficit in earnings might lead to foreclosure. In any event the holders of the new bonds have been asked to wait for the payment of two coupons now due. This caused a decline of 6¼ points in the seconds and 10⅛ points in Chicago & Erie firsts. Other declines of the receivership group were due to specific causes and were unimportant. The heavy advances were in St. Louis & San Francisco fours and fives, on the statement that they would be fairly treated in the Atchison reorganization, and Cleveland & Canton firsts, which advanced seven points on the action of owners which forced junior securities of the road to provide necessary funds to meet coupons falling due July 1, 1895. There was some liquidation notably in Atchison, Reading and Erie issues, but the bulk of transactions in these as well as other active issues of the group were speculative in their nature. The net changes by no means reflect the high or low points of the month as they are derived by comparing the last sale with the last sale in November.

The Granger group showed marked stability, as has often been pointed out; in this monthly review the leading issues are high, firm and from an investment point of view, offer very little incentive to capital, as the yield in many cases is not over 3 per cent. There was considerable activity in well known favorites, and the only decline of importance was of two points in the Nebraska Extension fours, which had a sharp advance the month previous, caused by realizing sales. No more striking example of the extent to which the general bond market is removed from speculative influences can be cited then the average advance of 44 in the Granger group in the face of the fact that various stocks touched their lowest point of the year. It is a case which illustrates the advantage of owning a bond on a road which pays stock dividends. Bad earnings and an unfavorable outlook indicate further dividend reductions.

The demand for bonds of the Southwestern roads which became excellent immediately after the election in consequence of the downfall of the Populist party in that section, fell off, and speculative buying of the low priced issues once more became the feature. Missouri, Kansas & Texas seconds were weak early in the month on important liquidation of a round lot, but later recovered. The fact has been practically established that they will receive their February interest. Texas & Pacific seconds, which receive a setback in the last week in November on account of an adjustment of a heavy Southern Pacific claim, just about held their own; they had a good market; transactions being unusually heavy. The net gain was ⅜ per cent. Wabash firsts and seconds were active, gaining fractionally.

Bonds of the coal roads, despite the unfavorable developments in the coal trade were staple, showing that they are removed from passing influences. Jersey Central was one of the weakest stocks on the list. Nevertheless, the Lehigh & Wilkesbarre bonds gained 1½ points. About the close of the month the coal trade changed decidedly for the better. There is now co-operation among the producing interests in the matter of restriction in prices; however, net revenues are much less than they were a year ago.

The Southern group is somewhat irregular. Its feature as well as that of the entire bond market was Southern Railway fives. Transactions were enormous, aggregating $2,034,000 par value. The highest price recorded, viz., 91¼, was made during the month, the net gain being 3¼ points. Investors are quite generally turning to this issue, as one of the few guaranteeing sure returns which can be purchased at low figures. Chesapeake & Ohio fives and four-and-one-halfs, so prominent in November, were less of a feature, changing only fractionally.

The miscellaneous group presents its customary irregularity due to specific rather than general causes. The most important advances of the month was in Brooklyn Elevated seconds, it being 12 points on limited transactions. The Brooklyn Elevated firsts advanced 2¼ points, Kings County Elevated two points, and Union Elevated firsts 4½ points. There is believed to be an important deal between these companies, which may result in increase net revenue earning power. Green Bay incomes sold at six which was a decline of four points. The first mortgage has been in default since August 1. The course of United States Cordage firsts was exactly what might be expected of a bond in which there is liquidation, uncertainty as to interest, and later knowledge that money has been borrowed for its payment. The high price was 72, the low 60, and the closing 67. The change as compared with the last sale in November was an advance of 1⅞ points. The average of the group showed an advance of 1.06 points.

In a table which follows are given the high, low and last sale of the month, together with the change, derived by comparing the last sale, with the last sale in November.

Atchison 4s	$2,053,000
Atchison 2nds	585,000
Broadway & 7th ave 5s	451,000
Chesapeake & Ohio gens 4½s	401,000
Chicago & Northern Pacific 5s	480,000
Missouri, Kansas & Texas 4s	520,000
Missouri, Kansas & Texas 2nds	675,000
Missouri, Kansas & Eastern 1sts	374,000
Oregon Short Line 6s	576,000
Pittsburg & Western 4s	306,000
Philadelphia & Reading gen 4s	395,000
Philadelphia & Reading 1st incomes	1,102,000
Philadelphia & Reading 2nd incomes	729,000
Philadelphia & Reading 3d incomes	647,000
Philadelphia & Reading deferred incomes	346,000
St. Louis & San Francisco con 4s	752,000
St. Louis & Southwestern 1sts	498,000
Southern Railway 5s	2,034,000
Texas & Pacific 1sts	335,000
Texas & Pacific 2nds	482,000
West Shore 4s	472,000
Wabash 2nds	329,000

The following table gives the sales (par value) of the active bonds during the month:

	High-est.	Low-est.	Last Sale.	Changes Compared with the Last Sale in November.
Roads in Control of Receivers.				
Atch., Top. & S. Fe 4s	65⅜	61⅜	63	— 1¼
" " " 2nds	19	16¼	17⅜	— 1⅝
Atlantic & Pacific 4s	45½	41	44	+ 3
Col. Midland 4s	21	18½	20½	+ ½
St. Louis & San F. 2nds A	114½	113⅜	114	+ 1
" " " " B	114½	11.⅜	114¼	+ ¾
" " " " C	114½	113⅝	114¾	+ ¾
St. L. & San Fran. gen 4s	53¾	44½	51	+ 6
" " " 5s	93	90½	90½	+ 5⅛
" " " 6s	106½	101	102½	
Erie 1sts, con. gold	133	130½	131	— 2
" 2nds	68	64	64	— 6¼
Chic. & Erie 1st	88	84	84	—10⅛
" " incomes	26	25	25	— 1
Northern Pacific 1sts	116⅝	116	116⅛	+ ¾
Northern Pacific 2nds	89¾	88	89½	+ 1¼
" " 3ds	60¾	59¼	59¾	1¼
" " con. 5s	28½	27	27	— 1
Nor. Pac. & Montana 1st	35	34	34	— 1
Chicago & Nor. Pac. 5s	43¾	39¾	40	
Wisconsin Central 1st	54½	52½	53½	— 2
Seattle L. S. & Eastern 1sts	46½	44	45	
Cleveland & Canton 1st	85	80	85	+ 7
Peoria, Dec. & Evans. 2nd	27¼	25	27¼	— ¾
Reading 4s	76½	74	75	— 1¼
Reading 1st incomes	28⅞	22	22¼	— 6⅛
" 2nd "	18¼	14½	14⅝	— 4⅛
" 3rd "	14½	11	11	— 3¼
" deferred incomes	4	2	2	— 2
Union Pacific 1st 1896	104	103¼	104	+ ¾
" " " 1897	104¾	104	104¼	+ ¼
" " " 1898	106½	105	105¾	— ¼
" " gold note 6s	89	87	87½	— 1½
" " sink fund 8s	99	97¾	97¾	— 1
Kansas Pacfiic cons 6s	77	75⅛	75⅛	
Oregon Navigation 1st 6s	112	110	110	+ ½
" " con. 5s	75	71¼	75	+ 3¾
Ft. Worth & Den. City 1st	74½	72¾	74	— ⅛
Ore. Short Line & U. N. con.	49	45½	47	+ ½
Oregon Short Line 6s	91	87	88¾	+ ¾
Atch., Col. & Pac. 1st	40	39	39	— 3
U. P. D. & Gulf 1st	40	39	40	
W. N. Y. & Penn. 1st	106	104¾	105⅞	+ 1⅛
" " 2nd	25⅛	24¼	24¼	— 1
Tol., St. L. & Kan. City 1st	62½	60	60	
Northern Pacific Terminal	99½	97	99	+ 2
Grangers Average decline, .40.				
Chicago Bur. & Quincy 7s	124¼	123⅜	124	+ ¼
" " " deb 5s	100¼	98⅞	100¼	+ ¼
" " " conv. 5s	103½	102	103½	+ 1
" " " Ia. div. 4s	100	98⅜	100	— 1⅛
" " " Neb. ext. 4s	88¾	87	87	— 2
St. Paul gold 7s	127	126	127	— ½
" " gen. 4s	91⅞	91	91½	
" " Terminal 5s	111	110⅛	111	
" " Chic. & P. W. 5s	114	11.½	114	+ 2
" " S. Minn. div. 6s	119	118	119	+ ¾
" " Dak. & Gt. So. 5s	108½	107½	108	+ 1
" " Chic. & Mo. River 5s	109½	107	107½	+ ½
" " Wis. & Minn. div. 5s	110	109	109½	— ½
Rock Island 6s	131	130¼	131	+ ½
" " deb. 5s	91¾	91	91½	+ ½
" " ext. 5s	104¾	103⅞	104½	+ ⅝
St. Paul M. & O. con. 6s	127¼	125½	125½	— ¾
Northwest gold 7s	121¾	121	121	+ ¼
" sinking fund 5s	110⅞	110	110½	+ ½
" 25 yr. deb. 5s	106½	105½	106½	+ 1½
" 30 yr. deb. 5s	107½	106½	107¼	+ ¾
St. Paul Southwest div. 6s	119½	117¾	119	+ 2⅜
Average advance, .44. *Trunk Lines.*				
Lake Shore 2nd 7s	123½	122½	122½	+ ½
Michigan Central 7s	121½	120½	120½	— ½
" 5s, 1931	115	114	115	+ 2
N. Y., Chic. & St. Louis 4s	102⅝	101⅝	102½	+ ⅝
New York Central 1st	127¾	127	127	— ⅝
" " ext. 4s	103½	102	102	— 1¼
Rome, Wat. & Ogd. ext. 5s	119⅛	117	119	+ 2
West Shore 4s	106¾	106	106½	+ ½
Pennsylvania 4½s	112	110⅝	113	+ 1¼
P. C. C. & St. L. 4½s "B"	106	105	105½	+ 1
Average advance, .60. *Southwestern.*				
Int. & Gt. Northern 1st	118	116¼	117⅛	+ 1⅛
" " 2nds	72	70¾	71¼	+ ¼
" " 3ds	28	25	28	+ 1
Mo., Kan. & Texas 4s	81⅛	80⅝	81	
" " 2nds	47	45½	46	— ½
Mo., Kan. & Eastern 1st	84⅞	83½	84¼	+ ⅝
Missouri Pacific cons. 6s	98	96	97	+ ½
Iron mt. 5s	80	78½	78¾	— 1
Pac. of Mo. 2nd	108	106½	108	+ 1
St. Louis Southwestern 1st	62½	59¾	62	— 1⅜
St. L. Southwestern 2nds	19½	18	18	
Texas & Pacific 1st	87½	86½	86¼	— ⅜
Texas & Pacific 2nd	26¾	24⅜	25¼	+ ⅜
Wabash 1st	105	104⅝	105	+ ¼
" 2nds	71¼	69½	70⅝	+ ⅜
" Det. & Chic. ext	100	99	99½	+ ½
Average advance, 41. *Transcontinental.*				
Denver & Rio Grande 1st	114¼	113½	114¾	+ 1¾
" " " " con. 4s	83	81¾	82¼	— ½
Nor. R. R. of Cal. 5s	92¼	91	91½	+ ¾
St. Paul M. & M. con. 6s	121¼	120¼	120¼	+ 1
" " " " 4½s	103¾	102	102½	+ ½
" " " " mon. ext 4s	85½	84	85½	— ½
So. Pac. of Cal. con. 5s	91½	90⅝	91⅛	+ ½
Rio Grande Western	71	69	70½	+ ½
Average advance, .50. *Coalers.*				
N. J. Central gen. 5s	116¼	114¼	115	+ ½
Leh. & Wilkes con. assn'd	108	105	108	+ 1½
N. Y. Ont. & Western 4s	88½	87¾	88¼	+ 2½
N. Y. Out & West. ref. 5s	112¼	108¾	111	+ 2½
N. Y. Sus. & West. gen	95½	94½	94½	— 1¼
N. Y. Sus. & West 2nd	89	88¼	89	+ 1
Averag. advance, .66. *Southern.*				
Louis & Nash gen. 6s	116½	115½	116½	+ ½
" " " gold 4s	78	76	76	— 1
Nash. Chatt. & St. L. 1st	136	135	136	+ 1½
" " " " con. 5s	101	100¼	100¾	+ ¾
Southern Railway 5s	91¼	87¾	91	+ 3¼
East Tenn. 5s	105	104⅛	104⅛	— ⅞
" " reorgan. lien	84	81½	81½	— 2½
Knox. & Ohio 1st	116	114½	115½	+ ¾
Georgia Pac. 1st 5-6s	113	111	113	+ 2
Vir. Midland gen. 5s	96	94	96	+ ⅞
Ches. & Ohio con. 5s	108	107	107	+ ¾
" " gen. 4½s	75¾	74¼	75¾	+ ⅜
" " 1st series "A"	120	118	119	+ ½
" " R. & A. 1s con. 4s	96	95¾	95¾	+ ½
Average advance, .38				
Brooklyn Elevated 1st	90½	85	87	+ 2½
" 2ds	65	52¾	65	+12
Broadway & 7th ave. 5s	111⅝	110	110¾	
Brooklyn City 1st	115⅝	113	115¾	+ 3
Bur., C. R. & Nor. 1st	106½	105	106⅛	+ ⅝
Canada Southern 1st	114	112	112¾	+ 1
Cin., Dayton & Ironton 1st	101¾	100⅛	101¾	+ 2¼
Chic. & East. Ill. gen 5s	98	94	96¾	— 1½
Gal., H. & San. An-Mex. P. 5s	92	90¾	92	+ 1½
Green Bay incomes	7½	6	6	— 4
Hocking Valley 5s	91¾	89	90½	— ½
" 6s	90	89	90	
Ill. Central 4s, 1953	99	98	98½	
Iowa Central 1st	87½	85⅞	85⅞	— ⅝
Kanawha & Michigan 4s	78¾	76½	78⅜	+ 1⅜
Kings County Elevated 1st	70	65	70	+ 2
Lake Erie & Western 1st	116⅝	114	114	+ 3
" " 2nds	105	103½	105	+ 1½
Louis., N. A. & Chic. 1sts	110⅛	108	110⅛	+ ⅜
" " con. 6s	97	96	96	+ ¼
" " gen. 4s	68¾	67½	68	
Mexican International 4s	71¾	70½	71	+ ¼
Minn. & St. Louis 1sts	135½	133½	135½	+ 1½
" " Southwest ext.	119½	117	119½	+ 2½
" " Pacific ext	118	116½	118	+ 1¼
" " Iowa div. 1st	121½	120½	121	+ ½
Mobile & Ohio gen 4s	66¾	65½	66	— ⅛
Ohio Southern 1st	96½	94	94	+ 1
" " gen 4s	49	45	45	— 4¼
Oregon Improvement 1sts	100	96	99	+ 1½
Oregon Improvement con. 4s	52	48	49	+ 1
Pitts & Western 1sts	85½	81¾	85½	+ 4¼
Tol. Peo. & West. 1sts	74½	72	73	+ ½
Union Elevated 1sts	88¾	88½	87	+ 4½

The Nicaragua Canal.

The issue of the *Journal of Commerce* (New York) of last Saturday, Jan. 5, contains a long and able article under the title of "The Nicaragua Canal Romance." A considerable part of this article is devoted to the development of the question of the traffic returns likely to be secured, a study which we had proposed to make. The *Journal of Commerce* has, however, saved us that labor, and what follows will be merely a short abstract of the article published in that journal.

Attention is called first to the astounding argument that the Nicaragua Canal has an advantage over the Suez Canal in that it will serve vast regions as yet very thinly populated, while the countries connected by the Suez Canal are old and densely populated. The *Journal of Commerce* thinks that no promoters of a railroad ever solicited capital by pointing out such a fact. We would remind that journal, however, that the promoters of the Chicago & St. Louis 100-mile-an-hour electric railroad used an argument something on the same line; that is, they would go from one of those cities to the other avoiding all the large towns on the way. Thus they would not be bothered with any local traffic.

The statement of the Canal Company gives the traffic entirely tributary to the canal as $315,000,000. Of this $113,000,000 is the value of European trade with the west coast of South America; but as most of this trade is in guanos and nitrates the probability is strong that it would still continue to go around the Horn rather than pay the charges of the canal. This probability is shown by figures in the article referred to. Another $90,000,000 of the entirely tributary traffic is trade between England and Germany on one side and Japan and New Zealand on the other; but from Liverpool to Yokohama it is 12,111 miles by Nicaragua and 11,740 by Suez, and it does not appear why the Japan trade should go by way of the Nicaragua Canal. From Liverpool to New Zealand the distance is 11,349 miles by Nicaragua and 12,000 by Suez. Here is a difference that would turn a part of the traffic through the Nicaragua Canal; but the Suez Canal has the advantage of tolls lower than those proposed for Nicaragua, and there are other advantages on that route in the way of providing coal and supplies and picking up a way business.

But this is not all. Mr. Morgan's report contains four times a table of distances from New York and Liverpool to various ports in the antipodes by way of the Cape of Good Hope and Cape Horn comparing these with Nicaragua, but in no case are the distances by the Suez given. Had these been given it would have been made obvious that the distances from Liverpool and from New York to India are thousands of miles less by Suez than by Nicaragua. The schedules of the Canal Company claim 5,333,415 tons (apparently of weight and not ship tonnage) as entirely tributary to the canal; 2,526,542 tons as largely tributary and 262,136 tons as partially tributary, but not entirely tributary. [Senator Frye in a speech delivered in the U. S. Senate, Feb., 1893, gave a table of estimated tonnage compiled by a former Senate Committee. These ran all the way from 3,706,000 tons by one authority up to 8,000,000 tons by the Canal Company in 1889 and 9,934,000 by the same company as probable in 1897. This is said to have been registered vessel tonnage.] Nearly 2,000,000 tons of nitrates and guanos must be thrown out as indicated above, and giving the canal the benefit of all doubt it might get 3,784,000 as entirely tributary tonnage. Of the tonnage claimed as largely and partially tributary very small portions will ever pass through the canal because of the considerations suggested above; that is, longer distances than by Suez and various commercial reasons. Finally, the *Journal of Commerce* arrives at the aggregate of 4,204,360 tons as a very liberal estimate of the canal business. But this must be materially reduced. A good freight steamer would have to save about 7,000 miles to justify its paying the canal tolls. In the tables of distances saved by the Nicaragua Canal the savings from New York to Hong Kong, New Zealand, Melbourne and Valparaiso do not approach 7,000 miles. In the table of saving of distances from Liverpool only those to San Francisco, Acapulco and Mazatlan approach or exceed 7,000 miles. Most of the great ports of the East are nearer to Liverpool by the Cape of Good Hope route and much nearer by Suez than by Nicaragua.

The tonnage that would go through the Nicaragua Canal has a very much larger proportion of coarse and low priced freights than that through Suez Canal; but the proposed toll is $2 a gross ton as against $1.85 per net ton through the Suez Canal. Yet the statement is made that the Suez Canal gets only 60 per cent. of the commerce it might get. If the Nicaragua Canal gets 40 per cent. of the commerce which it might get it would be doing well, and this would give less than 4,000,000 gross tons upon the basis of the company's figures of the total commerce. Making a liberal estimate, the canal might perhaps get 3,500,000 tons.

The *Journal of Commerce* next takes up the question of the estimates of cost and their probability and makes free use of the figures and opinions published in the *Railroad Gazette* about two years ago. It is not necessary for us to repeat any of this portion of the article now.

The next item taken up is the cost of maintenance, which by a comparison with the cost of maintaining the Suez Canal is put at $7,000 000 a year which would absorb the entire probable revenue from 3,500,000 tons at $2 a ton. We do not endorse this estimate, nor do we criticise it. We should want to study it much more carefully than is possible at this moment before expressing any opinion as to its value; but it suggests the necessity of far more careful scrutiny than has yet been made of the possibility of any return on the capital invested.

The bill gives the company, which has spent a little money and can raise no more, 4½ millions of bonds guaranteed by the Government, and $7,000,000 of stock. The statement of the attorney of the company is that the company has liabilities of $22,374,400 to be met by these stocks and bonds, but $12,000,000 of these liabilities is charged to payment for concessions. The concessions were purchased of Nicaragua and Costa Rica and the bill provides for paying them $7,500,000 in guaranteed bonds. Taking off the $12,000,000 paid by the company for the concessions, its liabilities remain as $11,374,400. The stock of the company is worthless, but it is to be redeemed at par. Much of it was issued by payment to contractors about 30 cents on the dollar. It is all to be redeemed at its face value. The attorney of the company says that the construction company has expended $4,451,568, and this is all the real expenditure, to reimburse which 11½ millions in stocks and bonds are to be paid.

The last topic taken up is the military aspect of our participation as a nation in the construction of the canal. This involves the enlargement of the navy, the maintenance of a foreign army and a revolution in the relations of the United States to the rest of the world. An officer reporting to the War Department says that, "In the event of war, especially with England, it would be vital to the interests of the United States to hold the Nicaragua Canal. Should the canal fall into the enemy's hands our coasts would be doubly in danger from cruisers and our land frontier seriously threatened by the ease of movement of troops. In such a war the United States must hold the canal to the end." But the canal would be held by the first power that got there with strong enough force. Hence we must fortify it in order to guard this, the most vulnerable point in our defenses. It would require "heavy sea batteries at its ocean extremities armed with guns with equal power to those carried by first class battleships. It would require all the essentials for torpedo defense and defense against boat attacks." On the coast we should build "barracks, hospitals, repair shops and everything essential for a large self-sustaining garrison." In addition to this, at Brito, on the eastern end, in spite of the heaviest land defenses likely to be built, war ships would be necesssary in the event of hostilities.

Of course, the military argument is that the canal must be built anyway, but that as it is going to be built we must control it by the constant presence of great military preparations. It has always seemed to us that this notion of a military occupation of the canal is absurd. Whatever fortifications and armament, and stores, and ships we collect will be turned against us if an enemy gets there with sufficient force to capture them, and until we rank with the first naval powers of the world there will be a strong probability of precisely that thing happening. Furthermore, we have great and rich cities strung along thousands of miles of sea coast, the fall of any one of which would be a vastly greater national misfortune than the capture of the Nicaragua Canal by an enemy. Until we have reasonably fortified our ports at home is it not preposterous for us to assume the necessity for holding the Nicaragua Canal?

It will be seen that the questions raised in its article are numerous enough and serious enough to call for long and patient and thorough study. We do not pretend to put forward a final opinion on any of them, but we present them now, as we have done before, in the hope that they will be very carefully considered before the nation is taxed for the benefit of the holders of the stock and bonds of the Nicaragua Canal Company.

The principal feature of the pass "disturbance" in New York State during the past week has been the decision of Judge Parker, of the Supreme Court, directing the Secretary of State to issue passes to the railroad commissioners. This phase of the subject is discussed in another column. The great bulk of officeholders, however, are still at sea, and something like 100 notaries public have sent their resignations to Governor Morton. The point has now been raised whether the trustees of the New York and Brooklyn Bridge can ride free on the bridge cars. It appears also that the general counsel of a railroad company who happens to be a notary public must either give up the latter office or pay his fare. Mr. Depew, President of the New York Central and member of the State Board of Regents, has declined an annual pass over the Manhattan Elevated for 1895. The anguish prevailing in several Western States, which we referred to a few weeks ago, seems to continue without abatement. Restriction of passes is an unheard-of thing in many places out that way, and its advent is resented in the same way that a mining camp resents the appearance of a silk hat or patent leather shoes. It is one of the observable facts of history that the adoption of a resolution to restrict passes in one direction is always seized upon by railroad managers as a pretext to cut them off in other quarters. Knowing the tiresome importunity with which most railroad officers are pestered in this matter, we utter no word of censure for this course, but we do feel sorry for some of the Western unfortunates. For instance, here is the way a Salt Lake City paper looks at the matter:

> The number of annuals that will be distributed among Salt Lake people this year can almost be counted on the fingers of the two hands, and they are confined almost exclusively to editors and ministers. Trip passes except to actual employees are practically prohibited. So much red tape is involved that the man who desires a pass to Ogden will be able to walk there and back before the returns are received on his application. For instance, should General Agent Burley, of the Union Pacific, be applied to for a trip pass, and feel disposed to grant it, he must submit the application, with his approval, to General Passenger Agent Bennett, of the Rio Grande Western. If approved by Mr. Bennett, it is referred to General Superintendent Bancroft, of the Union Pacific, who in turn consults Superintendent Welby, of the Rio Grande Western, and if all these officials endorse it, and the applicant is still alive and still desires the pass, it is granted.

A number of gentlemen largely interested in manufacturing have called a convention of manufacturers to be held at Cincinnati, O., Jan. 22, to organize a national association of manufacturers. Among the names of the Committee on Invitation we find the following which are well-known to our readers: Thomas P. Egan, President, Fay & Egan Co.; Charles Davis, President Lodge & Davis Machine Tool Co.; Robert Laidlaw, President, Laidlaw-Dunn-Gordon Co.; H. N. Lane, President Lane & Bodley Co. The committee suggests that the prosperity of manufacturing interests may be best promoted by concerted action and calls the convention for the purpose of general interchange of views, and lays down a programme of the objects of an association. These are to cement a national organization of manufacturers, to advocate carefully considered legislation, to encourage industry, to discuss the ways and means of developing foreign trade relations, to establish expositions in South America and elsewhere, to extend the commercial marine of the United States, to promote the recognition of the Nicaragua Canal and its control by the Government, and to establish reciprocal trade relations with foreign countries. It is desired that this convention shall be non-political, non-partisan and non-sectional. Manufacturers who are interested in the matter will do well to write immediately to Mr. E. P. Wilson, Secretary, Room A, Chamber of Commerce, Cincinnati, O. We should suppose that such an association might be very useful if it is really wisely directed and if it steers clear of the multitudinous socialistic and populistic doctrines and schemes which have a perpetual vogue with a large and vociferous class, and which never amount to anything because of their absolute impracticability. The names of the gentlemen composing the Invitation Committee indicate that this is a business movement and that it will be run as a business enterprise. As such it may be very useful.

On Christmas day a serious collision occurred at Waxahachie, Tex., a passenger train of the Houston & Texas Central being struck at a crossing by one of the Missouri, Kansas & Texas. Seventeen passengers were injured, two of them fatally. The engine of the M. K. &. T. train struck the rear coach of the other train about the middle. The M. K. & T. engineman says that he was running at about 25 miles an hour and tried to put on the brakes at the usual place of applying them to stop at the crossing, but found that they did not slacken the speed. He could not see the crossing until within about 150 feet of it, when he reversed his engine and applied sand. He and his fireman jumped when they saw that the train could not be stopped. They say they saw two men jump off the mail car which was at the head of the train, but saw nothing more of them. When he regained his senses the engineman examined the air brake connection and found that the cock was turned, shutting the main air pipe between the tender and the mail car. We have not been able to get any additional particulars of this accident, such investigation as has come to our knowledge tending merely to confirm the statement that the air was cut off. We are inclined, however, to take the two mysterious men who jumped off the mail car with a good deal of allowance. It is highly probable that the cock was not opened after the engine was coupled to the train.

At the last state election in New York a constitutional amendment was adopted requiring the Legislature to provide for the improvement and enlargement of the canals of the state, and Governor Morton in his message recommends deepening the Erie Canal to nine feet (the nominal depth now being seven), and deepening the Champlain Canal to seven feet. By the amendment the Legislature is authorized to create a debt for canal improvement, but the constitution also requires the Legislature to submit to the people all laws levying a tax for an expenditure other than the current charges of the state government. The people will have, therefore, an opportunity to defeat any scheme that seems ill advised. The New York Chamber of Commerce has framed a bill providing for the issue of bonds for $9,000,000 to be applied to improvements of the Erie, Champlain and Oswego Canals. The Erie and Oswego Canals are to be deepened to nine feet and locks and lock machinery to be improved. The Champlain Canal is to be deepened to seven feet, if the proposition is approved by the people at the general election in November, 1895.

Representatives of the principal roads carrying anthracite coal met in New York last week to see about an agreement for division of the coal traffic. All attempts to restrict competition in coal have heretofore taken the shape of agreements between the companies as producers, the larger companies being owners of mines as well as common carriers. The very indifferent success with which this movement has been attended is familiar to our readers. But even when the large companies have found themselves in substantial agreement the Pennsylvania Railroad has always refused to join in any definite understanding, on the ground that such action would be in vio-

lation of State laws forbidding any contract or agreement tending to increase the price of necessaries of life. The present attempt at a transportation agreement is due to the fact that the Pennsylvania is constantly becoming a more important factor in the coal market by reason of its increasing production. It does not yet appear that any marked progress has been made. But if the Interstate Commerce law is not amended so as to modify the restriction of the fifth section it will be as obnoxious to the law to make a pool of railroad traffic as to combine to fix the selling price of coal or to restrict production. Of course it is possible, however, to form an agreement as to the proportion of freight which each competitor will endeavor to restrict himself to, at any shipping point, without violating the anti-pooling law.

Judge Speer, in the United States Court, at Macon, Ga., has decided that the receivers of the Central of Georgia have no authority to subscribe for the bonds of the Cotton States Exposition Company. The Farmers' Loan & Trust Co., trustees for bondholders, oppose the application of the receivers for the power referred to. The Judge cited a large number of authorities to sustain his view, the one quoted most at length being that of Judge Gray in the case of Davis vs. Old Colony, 131, Mass. 258. The case of the State Board of Agriculture vs. Citizens' Street Railway, 47, and, 407, was decided the other way; but the parties had already acted in good faith upon the *ultra vires* contract. Judge Speer also referred to decisions by the Supreme Court of the United States and English courts of high authority (Case vs. Kelly, 133 U. S., 21).

A contemporary, beginning a series of articles on signals and signaling and wishing to start in at the bottom, says: "The lack of general information in regard to the application and uses of signals and signaling apparatus which is possessed by the average railroad man is perhaps not altogether surprising when technically considered." We are not disposed to question the searching wisdom of this sentence, but we venture to say that the biggest obstacle in the way of good signal practice on the railroads just now is the lack of money "which is possessed" by the treasuries of the railroads.

TECHNICAL.

Manufacturing and Business.

The Long Island Railroad has placed a contract for a new pier shed with the Berlin Iron Bridge Co., of East Berlin, Conn.

The Carnegie Bridge Co., of Chicago, has been incorporated by John C. Fleming, William H. Eaton, and P. W. O'Brien.

The Bucyrus Steam Shovel & Dredge Co. South Milwaukee, Wis., has increased its capital stock from $150,000 to $250,000.

The Ohio Falls Car Mfg. Co. has declared a dividend of two per cent. on its preferred stock for the quarter ending Dec. 31.

The Gould Coupler Co., of Depew, N. Y., will probably establish a branch factory in Canada, it is said, giving employment to about 100 men there.

The Northern Pacific has awarded a contract to U. C. Davie, of Tacoma, Wash., to deliver to the railroad 85,000 ties to be distributed from Easton to Portland.

The White Manufacturing Co. has been incorporated to manufacture railroad castings in New York City. The directors are E. C. White, C. A. Lieb and William H. MacCarthy, of New York City.

The Galveston-Houston Construction Co. has been incorporated in Texas for the purpose of constructing railroads and bridges. William T. Sherwood, of Galveston, Tex., is one of the incorporators.

Messrs. Fisher & Porter are established as Western Sales Agents of the Bethlehem Iron Co., at 1,025 Monadnock building, Chicago. Mr. Porter was Assistant Chief of the Machinery Department of the World's Fair.

The Standard Coupler Co., of 26 Cortlandt street, New York City, has removed its shop from Troy, N. Y., to Bridgeport, Conn., from which point all future shipments will be made. Its facilities have been largely increased, and the company will now be able to fill promptly all orders.

The Sargent Company, of Chicago, started up its open hearth steel furnace last week. Only the iron foundry and crucible steel furnaces have been operated for some time, and no open hearth steel castings have been made since June, 1893. The firm has railroad orders to keep its open hearth works busy for a considerable time.

The Peckham Motor Truck & Wheel Company's business during 1894 showed a decided increase over that of the preceding year. The company found no difficulty in running its works at full capacity during the entire year. More than 2,000 of the Peckham trucks are now in use on cable and electric roads in New York City, Brooklyn, Jersey City, Hoboken and Philadelphia. Among the 10 roads on which the Peckham trucks have been adopted as standard may be mentioned the Atlantic Avenue Road in Brooklyn, the Consolidated Traction Company's lines in Jersey City, the People's Traction lines in Philadelphia, and the Metropolitan Street Railway Company's lines in New York City. The Peckham Company has brought out during the year its new "Excelsior" truck. The chief feature of the company's work during the year, however, has been the care given to the small details of construction. Many improvements have been made where the varying requirements of street railroad service indicated that changes or improvements were desirable.

Iron and Steel.

The Laughlin & Junction Steel Co., operating a Bessemer steel plant and cut nail factory at Mingo Junction, O., has been succeeded by the Junction Iron & Steel Co., which concern will execute all contracts of the old firm.

The Lackawanna Iron & Steel Co., of Scranton, Pa., has commenced work on a new boiler shop, 239 x 78 ft., to cost $50,000. The erection of this building has been made necessary by the company's recent purchase of the blast furnaces at Lebanon.

The Akron Iron Co., Akron, O., for some time in the hands of J. A. Long, receiver, is to be reorganized. A number of creditors have consented to terminate the receivership and the concern will be under the control of the creditors until all debts have been paid.

The Bessemer steel department of the National Tube Works Co., McKeesport, Pa., turned out recently 782 tons of billets in 24 hours. This plant is equipped with a single 36-inch reversing blooming mill, and the above output is believed to be the largest on record for the above time for any mill so equipped.

The Allegheny Bessemer Steel Co. has begun a suit against the Choctaw Coal & Railway Co., to recover for a breach of contract entered into on April 23, 1890. The Choctaw Co. agreed to purchase 14,000 tons of steel rails at $31.25 a ton. One thousand tons of the rails were made, but the railroad declined to receive them.

During 1894 the Pennsylvania Steel Works made more girder rails and street railway crossings and switches than ever before, about two thirds of the rails being girders. There was an encouraging activity in bridge and structural building, and a fair demand for slabs and blooms. The company has had three furnaces in blast nearly all year. December was a fairly active month in certain branches of this big plant, but January promises to be a dull month.

Final notice has been sent to the creditors of the Reading Rolling Mill Co., and Cofrode & Saylor, incorporated, that application will be made to the courts for a writ dissolving the receivership and restoring the business to the control of the two corporations on Feb. 1, next.

The Launch of the Northland.

The Northland, the sister of the Northwest, was launched at the yards of the Globe Iron Works in Cleveland last Saturday, Jan. 5. This vessel is a duplicate of the Northwest, which we have described at considerable length in former issues and which was the pioneer in an interesting and agreeable experiment in lake passenger business. The vessel was christened by Miss Martha Peyton, of Duluth, and in the evening a banquet was given by the Northern Steamship Company. The vessel will probably be ready for regular service early in the summer.

The Nicaragua Canal.

A canvass of the standing of the Nicaragua Canal bill in the Senate shows that there is great division of opinion among the Senators, and there are those who say that a majority of the Republican members will not vote for the bill, although heretofore there has been great confidence that a nearly solid Republican vote could be got. Indeed it is not at all certain at the time of this writing that the bill can be brought to vote in the Senate this session.

The Pennsylvania Contract for Rails.

The Pennsylvania Railroad Company made its contract for steel rails this year at $22 a ton. The contract calls for 30,000 tons, divided as follows: 8,000 tons each to the Cambria, the Pennsylvania and the Carnegie Steel Companies, and 6,000 to the Scranton Steel Co. In 1890 the market price of steel rails in the east was $32 a ton; in 1891, $30; in 1892, $30; in 1893, $28; in 1894, $24, and in 1895, $22.

THE SCRAP HEAP.

Notes.

A fire in the yard of the South Florida Railroad at Port Tampa on Jan. 1, destroyed 25 loaded freight cars and five passenger train cars.

Western papers report the appointment of a woman physician as division surgeon of the Northern Pacific at Hope, Idaho. Her name is Carrie Liebig.

Six masked men tried to rob a passenger train near Camden, Ark., on the night of Dec. 31, but failed. They compelled the engineer to take the first car and run forward a mile or two, but when this was done they found that they had the wrong car. On the same night, near York, Ala., an express car on the Alabama Great Southern was robbed, but the messenger succeeded in secreting most of the money. At the scene of the Camden robbery a pile of sleepers was found on the track the night following.

The California Supreme Court has decided against the Central Pacific Railroad Company in the matter of taxes assessed by the State Board of Equalization for the year 1888. About $700,000 is involved. The decision declares among other interesting points that it is lawful to assess a railroad at its value without deducting the amount of its mortgage as is done in the assessment of other property. The Supreme Court also rejects the contention that the assessment in question is void for the reason that it includes the franchise received by the railroad company from the United States. It was contended that the franchises received from the State had been merged into that given by the United States. The decision declares the contention not supported.

The Year's Shipping Losses on the Great Lakes.

The Weather Bureau at Detroit, Mich., has compiled the losses to lake marine shipping for the year 1894 due to weather conditions. The number of vessels that met disaster on the Great Lakes was 112, and the number of lives lost 62. Of these vessels 43 were total losses, entailing financial losses of $643,243, and 69 were partial losses, with damages aggregating $349,787, making a total money loss of $993,030. These casualities do not include fires and collisions.

The Rapid Transit Expert Board in New York.

The Rapid Transit Commissioners of the city of New York resolved week before last to appoint a board of five experts to review the report of Mr. W. B. Parsons, concurred in by Mr. Theodore Cooper and Mr. Alphonse Fteley. The resolutions explaining the powers and scope of this board appeared on page 3 of our last issue. The names of the gentlemen appointed to make up the board of experts were announced last week as follows: Messrs. Abram S. Hewitt, T. C. Clarke, W. H. Burr and Charles Sooysmith, all of New York, and Mr. Octave Chanute, of Chicago.

The Delaware River Bridge of the Pennsylvania.

Only a few months ago local companies were incorporated in Pennsylvania and New Jersey, by officers of the Pennsylvania railroad, to build a bridge over the Delaware River, but the preliminary work has gone ahead so rapidly that the contracts for the substructure were let last week, by Chief Engineer Brown. The bridge is to be a double track structure crossing the Delaware River near Bridesburg, about five miles above Philadelphia, and a short distance above Port Richmond, the coal shipping port of the Philadelphia & Reading road. The bridge will connect the West Jersey and Camden & Atlantic roads with the main lines of the Pennsylvania. The bridge consists of two through spans of 533 ft. span on the Pennsylvania side, of a draw span with two arms of 165 ft. length, and one of 533 ft. through span on the Jersey shore. The trusses have straight bottom and curved top chords. Viaducts form the approaches to the bridge at both ends. The shipping circles of Philadelphia had opposed the 50 ft. clearance above high water of the new bridge as insufficient. The Secretary of War has, however, approved of the present location of the bridge, and the City Attorney of Philadelphia has given the opinion that the Port Wardens of the city have no jurisdiction, the decision of the Secretary being made.

At the site of the bridge a stratum of clean, rather coarse sand, varying in depth from 20 to 32 ft., extends across the river, and is underlaid by a stratum of stiff clay of from 4 to 18 ft. depth. The invitations for bidding on asked for the foundations of the four river piers, to be either iron or steel open caissons, loaded with concrete, and sunk by the open dredging process, or to be metal or wooden caissons sunk by the pneumatic process. The foundations of the two shore piers are to be composed of timber grillages on piles. There were nine bidders for the bridge pier, the Drake & Stratton Co. being the successful bidders. The contract was awarded to them on the plan of using the pneumatic process and wooden caissons. The intention is to sink all caissons to a uniform depth below high water, the bottom of the caissons resting in the deep sand stratum, above described. Faces of the pier above the foundations are to be rock range work set in hydraulic cement mortar.

The contract for the masonry for the bridges over the Philadelphia & Trenton R. R. yard tracks, over Wheatsheaf Lane and Sepviva streets, and over Luzerne and Tulip streets, have been let to P. McManus, of Philadelphia. The contract for all the pile work required on the trestle approach to the bridge has been let to Armstrong & Printzenhoff, of Philadelphia. The timber for the temporary trestle will be furnished by the railroad company, and framed and erected by the carpenter force belonging to the company. The contract for the masonry on the eastern approach to the river bridge, as well as the bridge over the Camden & Amboy Railroad, in New Jersey, has been awarded to C. A. Sims & Co., of Philadelphia. The contract for the superstructure will not be awarded for some weeks.

LOCOMOTIVE BUILDING.

The Cleveland, Lorain & Wheeling will probably order six or eight locomotives in the spring. The matter is still unsettled and it will be several weeks before there is any decision as to whether they will be purchased or not.

CAR BUILDING.

The Norfolk & Western has contracted with the Central Car Trust Company of New Jersey for building 500 box cars to be used on the Norfolk & Western road.

The Memphis Car and Foundry Company, Memphis, Tenn., is now building tank cars for the Crescent Oil Co., also the Goyer Tank Line Co.

The Ryan & McDonald Construction Co., at Curtis Bay, South Baltimore, has completed its contract for 50 freight cars for the Monterey Mining & Terminal Co., of Mexico. The cars are shipped in sections, and are being put together at Monterey.

The order of the Merchants' Despatch Transportation Co. for 300 cars has been divided between the Union Car Co., of Depew, N. Y., and the Michigan Peninsular Car C., each company to build 150 cars. They will be 36 ft. refrigerator cars.

The West End Street Ry., of Boston, is reported as about to order a large number of open summer cars.

The Baltimore & Ohio Southwestern is reported as about to build 300 stock cars.

The Kansas City Provision Co. is reported as considering the ordering of about 50 refrigerator cars.

The Missouri Car & Foundry Co. has received an order from Armour & Co. for 200 refrigerator cars.

The Cleveland, Cincinnati, Chicago & St. Louis is building about 50 flat cars at its Linton shops.

The Missouri, Kansas & Texas gave out to the car builders this week specifications for the 2,000 freight cars to be built for that company. As stated in the *Railroad Gazette* of Dec. 21, this order is to include 800 box cars, 500 coal cars, and 700 furniture cars.

The Cold Blast Transportation Co., of Kansas City is in the market for 100 freight cars. The cars owned by this company are operated in the service of Schwarzchild &

Sulzberger Co. of New York and Kansas City. The President is Mr. Ferdinand Sulzberger, whose office is in New York City.

BRIDGE BUILDING.

Allentown, Pa.—The Allentown & Lehigh Valley Traction Co. proposes to build a new bridge across the Lehigh River, between Bethlehem and South Bethlehem. The company will ask the two towns to each bear a proportion of the expense.

Bath, N. Y.—The war department has decided adversely on the proposition to bridge the Hudson River at Bath. The report of Col. Gillespie, upon which the Secretary of War bases his action, shows that the construction of the birdge at the location and in acordance with the plans submitted June 11, 1892, would cause unreasonable obstruction to naviagtion of the Hudson river.

Caledonia, Wis.—The Wisconsin Bridge & Iron Works of Milwaukee have been awarded the contract for building a new bridge across the Baraboo River at Caledonia. The bridge will be 110 ft. long and will have a 16-ft. roadway.

Collinsville, Conn.—The Berlin Iron Bridge Company, of East Berlin, Conn., are putting up a large iron bridge at Collinsville, Conn.

Elmira, N. Y.—The Geneva & Waterloo Street Railway Co. will erect an iron bridge across the Seneca River in the western suburbs of Waterloo.

Findlay, O.—Bids will be received until Jan. 15, by C. B. Metcalf, Auditor Hancock County, for building an iron bridge over the Blanchard River in Marion Township.

Hamilton, Ont.—Tenders addressed to Mr. E. F. E. Roy, Secretary, Department of Public Works, Ottawa, Ont., will be received until January 10, for the construction of the pivot pier and abutments of a swing bridge over the Burlington Channel, near this city according to plans and specifications to be seen at the Custom House in this city and at No. 36 Toronto street, Toronto. The bridge is to be 262 ft. in length.

Marietta, Ohio.—In an interview, last week, at Marietta, Ohio, Mr. W. G. Wilkins, of Wilkins & Davidson, engineers, of Pittsburg, said his firm represented a number of Pittsburg capitalists, who would build a highway bridge across the Ohio River between Marietta, Ohio, and Williamstown, W. Va. A charter has been secured in West Virginia, and the plans for a good part of the work have been completed. He is now making surveys of the river, to be submitted to the War Department.

Natchez, Miss.—Bids will be received by A. H. Foster, Clerk, Adams County, until Feb. 4, for the construction of a steel birdge over the Homochitto River, at Swayze's Ferry, Miss.

Pittsburg, Pa.—In his annual report Director of Public Works Bigelow suggests the construction of a $65,000 bridge at the entrance to Schenley Park to take the place of the present wooden structure.

Port Huron, Mich.—Bids will be received at the office of the Superintendent of Public Works of Port Huron, Mich., until Feb. 1, for the construction of a steel swing bridge and approaches, with substructure, including a protection pier over Black River.

Providence, R. I.—Bids will be received by the Commissioner of Public Works of Providence, until Jan. 31, for erecting a steel highway bridge, with two fixed spans, each about 90 ft. long, and one draw span about 210 ft. long, over the Seekonk River in Providence.

Scranton, Pa.—A resolution has been introduced into select council directing the city engineer to prepare plans and specifications for a viaduct over the Delaware, Lackawanna & Western tracks on North Main avenue. The structure would be about 1,000 feet long, and will cost about $45,000.

Somerville, Mass.—The Berlin Iron Bridge Co. is building a new highway bridge for the Boston & Maine Railroad at Somerville, Mass.

Toledo, O.—City Engineer Miller has prepared detailed plans for the proposed new city bridge over the Maumee, between Fassett street and Walbridge avenue. The plans were laid before the State Board of Public Works at Columbus this week.

Bids for $23,000 of bridge bonds will be opened by the Ways and Means Committee on canals on Jan. 21. The balance of the issue has been taken by the Sinking Fund Trustees. They are to run 20 years and bear 4½ per cent. interest annualy, payable semi-annually.

Volga, S. D.—Bids will be received by D. R. Sweezy, County Auditor, for the erection of a steel bridge across the Sioux River. There will be one span 75 ft. long.

Welch, W. Va.—The county court of McDowell County, W. Va., with headquarters at Welch, has decided to build a steel or iron bridge over Tug River, near the mouth of Brown's Creek. The plans as prepared call for a bridge of 100 feet span, built on cylindrical columns, 28 ins., outside diameter, 14 ft. clear roadway with sidewalks, approaches to be of timber, 30 ft.

Youngtown, O.—The Youngstown Bridge Co. has received a contract to build an iron viaduct 4,000 ft. long from Padre Island into the Gulf of Mexico.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Burlington, Cedar Rapids & Northern, semi-annual, 1¼ per cent., payable Feb. 1.
Central of New Jersey, quarterly, 1¾ per cent., payable Feb. 1.
Chicago Junction Railways and Union Stock Yards Co., semi-annual, 3 per cent. on the preferred stock, and 4 per cent. on the common stock, payable Jan. 28.
Mine Hill & Schuylkill Haven, 3½ per cent., payable Jan. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Brockwayville & Daguscahonda, annual, Philadelphia, Pa., Jan. 14.
Crawford Junction & McKean County, annual, Philadelphia, Pa., Jan. 14.
Daguscahonda & Elk, annual, Philadelphia, Pa., Jan. 14.
East Broad Top Railroad & Coal Co., annual, Philadelphia, Pa., Jan. 14.
Fort Wayne & Jackson, annual, Jackson, Mich., Jan. 25.
Lehigh Valley, annual, Philadelphia, Pa., Jan. 15.
Philadelphia & Reading, annual, 12th and Market Sts., Philadelphia, Pa., Jan. 14.
Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 14.
Pickering Valley, annual, Philadelphia, Pa., Jan. 14.
Reading & Columbia, annual, Philadelphia, Pa., Jan. 14.
Western New York & Pennsylvania, annual, Philadelphia, Pa., Jan. 14.
Worcester, Nashua & Rochester, annual, Worcester, Mass., Jan. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Freight Claim Association* will hold its annual meeting in Chicago on March 13.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

Central Railway Club.

The next meeting (the Annual) of this club will be held at the Hotel Iroquois, Buffalo, N. Y., on Wednesday, Jan. 23, at 10 A. M. The discussion of Mr. Morford's paper, on Terminal Yards, was postponed until this meeting, and the members of the Buffalo Railway Superintendents' Association have been invited to be present and take part in the discussion. The committee on "Freight Car Door Hangers, Fasteners, etc.," will make a more comprehensive report, which the short time allowed them at the last meeting did not permit. Election of officers for the ensuing year will be held as follows: President (under the last amendment this officer for the year '95 must be a representative of the Motive Power Department). Vice-President, Secretary and Treasurer, and six members of the Executive and Finance Committee.

Western Society of Engineers.

About 120 members and guests sat down to the annual banquet of the Western Society of Engineers held in the Grand Pacific Hotel, Chicago, on January 2.

The retiring president, Mr. Hiero B. Herr gave a review of the work done by the Society during the last year. He then introduced the new president, Mr. Horace E. Horton, who made a few brief remarks. The next speaker was Mr. Willard A. Smith, who explained the objects of the Society. Mr. N. S. Patton, President of the Municipal Improvement League was introduced and spoke on the friendly relations existing between the architects and engineers. He dwelt upon the necessity of using great care in the design and construction of buildings as too many of the streets are spoiled by unsightly structures. He opposed the use of Wabash Avenue for the elevated road as there were enough alleys which could be used without defacing the avenue. A letter was received from Mr. E. L. Corthell, who is ill in Switzerland, extending his greetings to the Society.

Mr. George L. Wilson, President of the St. Paul Society of Engineers replied to the toast of "Our Sister Societies" and extended the greetings of the St Paul Society. Mr. George S. Morison gave an outline of the policy of the Society. He thought that the Society should branch out more and include all kinds of enigneers and should not be merely a local organization. He also suggested that elevated roads should be constructed so as to correspond more with the elements of form and grace.

Judge Vincent representing the Civic Federation spoke of the responsibility of engineers and advised more combination among them in order to maintain their rights. Mr. J. Randolph, Chief Engineer of the Chicago Main Drainage Canal, responded to the toast "Our Greatest Public Work." Speeches were made by B. L. Crosby, President of the Engineers Society of St. Louis, L. Taft, J. G. McCarthy and Professor Hatch, the latter speaking on "Technical Education." The present officers of the Society are: Horace E. Horton, President; Daniel W. Mead, First Vice-President; Henry C. Draper, Second Vice-President; Edwin G. Nourse, Secretary and Librarian; W. L. Stebbings, Treasurer; John W. Cloud, Trustee.

The present membership is 424.

PERSONAL.

—Baron de Courcel, recently appointed Ambassador of France to Great Britain, is President of the Orleans Railroad Company.

—Gen. John B. Gray, Agent for the American Brake Company, was married to Mrs. C. E. Arthur, of Brooklyn, N. Y., at Evansville, Ind., on Jan. 3.

—Mr. W. D. Dimock has been appointed assistant general Passenger Agent of the Providence & Stonington Steamship Co., vice Mr. J. N. Babcock, resigned.

—Mr. C. M. Bissell, of New York, has been elected Vice-President and General Manager of the Findlay, Fort Wayne & Western Railroad, vice Mr. C. G. Patterson, resigned.

—Mr. C. A. Cairns, lately chief clerk in the general passenger department of the Chicago & Northwestern Railroad, has been promoted to be Assistant General Passenger Agent.

—Col. E. B. Wheelock, general agent of the Texas & Pacific Railroad, died at New Orleans last week. He had been associated with the Texas & Pacific since the road was built into New Orleans.

—Ex-Governor L. S. Ross, who was appointed State Railroad Commissioner of Texas, by Governor-Elect Culberson, has declined, and will continue as president of the Agricultural & Mechanical College at Bryan, Tex.

—Mr. Frank H. Coolidge, formerly southern agent for the American Brake Co., of St. Louis, has recently been appointed to an important position with the Stillwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, the well-known manufacturers of pumps, heaters, and railroad supplies.

—The news from Mr. E. L. Corthell continues favorable. He is still in Berne, Switzerland, is in very good general health, active, and of course full of projects. He intends to return to the United States in the spring. Nobody can say, however, anything more than that his final recovery is fairly probable.

—Mr. John Thorne, ex-President of the Utica & Black River Railroad, died very suddenly last week in Utica, N. Y. He was 84 years old. He was engaged in many undertakings, but was best known in his connection with the Utica & Black River road, which was developed during his presidency of nearly fifteen years.

—Mr. F. Slater has been appointed general foreman of the locomotive department of the Chicago & North Western with headquarters at the West Chicago shops, the appointment to take effect Feb. 1. Mr. Slater has been general foreman of the Milwaukee, Lake Shore & Western at Kaukauna, Wis., and has been in the company's service there for the last 13 years.

—Vice-President and General Manager P. C. Purdy, of the Missouri Kansas & Texas Railroad, has secured an extended leave of absence, and is now in Europe. Mr. A. A. Allen, the present General Superintendent of the Missouri, Kansas & Texas, has been appointed Assistant General Manager to perform the duties of Vice-President during Mr. Purdy's absence.

—Mr. J. W. Cook, of Shenandoah, Va., has been promoted to be division superintendent of the Norfolk & Western Railroad, from Roanoke to Hagerstown. Mr. Cook has been the superintendent of the line from Shenandoah to Hagerstown. He takes the place of Mr. D. W. Flickwir, who resigned in order to devote all of his time to the interests of the Shenandoah Furnace Company, of which he is President.

—Mr. John N. Sherrard has been appointed Assistant General Manager of the Taylor Iron & Steel Co., of High Bridge, N. J., manufacturers of car axles, and of the Hadfield manganese steel castings. Mr. Sherrard has been engaged by the receivers for the past year or so as blast furnace Manager and Superintendent of the Bessemer Steel Works. He was for about 13 years chief chemist of the Troy Steel & Iron Co.

—Mr. Anthony Barrett has retired from the office of General Manager of the Brookyn Union Elevated Railroad, and Mr. George W. Wingate was last week chosen in his place. Mr. Barrett has been a director of the company since its incorporation, and he has been the trustee of 23,342 shares of stock of the company which has figured a good deal in the history of the company, but the actual ownership of which has never been made public. Mr. Barrett became General Manager of the road about a year ago.

—Mr. Thomas Clapp Cornell, died at Yonkers, N. Y., Dec. 29. He was born on Jan. 7, 1819, in Flushing, L. I. In 1840 he entered the engineer service of New York State on the Erie Canal enlargement. From 1844 to 1846 he was in the employ of the Canadian government at Montreal, on the Lachine Canal. In 1847 he was employed in the construction of the New York Central Railroad as assistant engineer. For many years he has been president of the Yonkers Gas Light Co., and a prominent citizen of that town.

—Mr. R. K. Brown, assistant engineer of the Pittsburg, Cincinnati, Chicago & St. Louis, at Pittsburg, has been promoted to engineer of the Richmond division of the Pennsylvania lines. Mr. Brown has been with the Pennsylvania Company for six years, having first entered the services of the lines at Wellsville, O., was transferred to Cincinnati, and from there came to Pittsburg, where he has been for almost three years. He will be succeeded at Pittsburg by Mr. Thomas B. Hamilton, who has been in the maintenance-of-way department of the Panhandle for five years.

—There died recently in Moscow one of the great railroad builders of Russia, whose career shows that in that country, as well as this, men may work their way up from poverty. P. J. Gubonin was the son of a serf, and followed his father's trade as a stonecutter and maker of whetstones, after a time taking contracts for such work, which brought him into contact with road and railroad contractors. In 1848 he began to take large contracts, and during the railroad building era in the sixties, he became a leading contractor and built five different railroads, and parts of several others.

—Mr. J. C. McCuen, who for three years has been Master Mechanic of the Alabama Great Southern Railroad in Birmingham, Ala., has been promoted to the position of Master Mechanic of the Queen & Crescent shops at Ludlow, Ky., on the Cincinnati Southern division. He is succeeded at Birmingham by Mr. J. B. Skinner, who has been general foreman at the Ludlow shops. Mr. McCuen has been Master Mechanic at Birmingham for three years and was formerly Master Mechanic of the Vicksburg, Shreveport & Pacific division at Monroe, La. He has been with the Queen & Crescent for twelve years altogether.

—Mr. J. D. Hawks has been elected Vice-President and General Manager of the Detroit & Mackinaw Railroad in Michigan, under which name the Detroit, Bay City & Alpena road has been reorganized, with Mr. C. H. Coster of Drexel, Morgan & Co. as President. Mr. Hawks is very well known to railroad men and was for many years chief engineer of the Michigan Central Railroad. In 1892 he resigned that position to become General Manager for the Detroit Citizens Railroad Co. For some months past, however, he has been Manager of the Detroit, Bay City & Alpena Railroad, which has been under the control of a Receiver. He remains as General Manager of the Citizens Railroad also.

—Mr. H. Colbran, general agent for the Atchinson, Topeka and Santa Fe, at Denver, and formerly general manager of the Colorado Midland, has resigned his position with the Atchison to give his entire time to the duties of his position as President of the Midland Terminal Railway Co. He will be succeeded, it is said, by Mr. A. P. Tanner, assistant general freight agent of the Atchison at Topeka. The Midland Terminal road is one of the two

lines reaching the Cripple Creek mining district in Colorado. It is about 28 miles long, and Mr. Collbran is really its projector and builder.

Mr. C. A. Cairns, the chief clerk of the General Passenger Department of the Chicago & Northwestern has been appointed Assistant General Passenger Agent of that road to succeed Mr. W. B. Kniskern, who has been promoted to the General Passenger Agency. Mr. Cairns is one of the best known of the younger Western passenger officials. Mr. Cairns began his railroad career in 1878 as a messenger in the President's office of the "Bee Line," at Cleveland, Ohio. In 1889, when he was made Chief Clerk of the Chicago, St. Paul & Kansas City (now the Chicago Great Western), which position he retained until Jan. 1, 1890, when he was appointed Assistant General Passenger Agent of the same company, where he remained until August, 1892, when he accepted the position of assistant to Assistant General Passenger Agent Kniskern, of the Northwestern.

—Mr. William Lush died in Poughkeepsie, last September after a four years' illness, the effects of over work. Mr. Lush was about 45 years of age, and was engaged for 17 years ending August, 1886, upon the New York Central & Hudson River Railroad as Assistant Engineer, Resident Engineer, and Principal Assistant Engineer. Among the many works executed under his charge was that of elevating the New York Central through the streets of Rochester. He left the New York Central to become the Chief Engineer of the St. Joseph & Grand Island Railroad which he constructed. He was Chief Engineer of the Kansas City & Omaha afterwards; he was then engaged on the Union Pacific, under Mr. V. G. Bogue, until 1890 when his health failed him. Mr. Lush had many friends as an engineer and was noted for his good judgment, skill and energy.

—Mr. Charles O. Russell, for 15 years General Superintendent of the Boston & Albany, died at Springfield, Mass., on Tuesday last at the age of 70, a month after that of his brother William, which was noted in these columns December 14. Mr. Russell was one of the most popular officers that ever served the Boston & Albany. While efficient as a manager and thoroughly devoted to the interests of the company, he made friends everywhere, both with the public and among the employees, without effort, being genial, modest and a perfect gentleman. He began his service on the road in 1845, and was clerk or paymaster until 1858, when he became Assistant Superintendent. He was made General Superintendent in 1867 on the retirement of Henry Gray, and resigned in 1882. He had suffered from rheumatism for more than 20 years, and had been in very poor health for a long time.

—Mr. E. M. Herr has accepted the position of Assistant Superintendent of Motive Power of the Chicago & North western Railway. Mr. Herr has had a varied experience in railroad work, and has well filled every position he has held. He is a graduate of the Sheffield Scientific School at Yale, and was a shop apprentice in the West Milwaukee shops of the C. M. & St. P., and afterward served some years in the C. B. & O. as assistant engineer of tests, engineer of tests, superintendent of telegraph and division superintendent. He was later division master mechanic of the C. M. & St. P. at Milwaukee, and then became superintendent of the Grant Locomotive Works at Chicago When that concern closed he made an extended tour closely studying railroad mechanics and engineering. One of the results of that trip was the remarkably thorough and discriminating series of articles on German railroad practice written for *The Railroad Gazette* and published last year. On his return he became general manager of the Gibbs Electrical Works at Milwaukee. For several months past he has been in Russia, on leave of absence, investigating Russian methods of locomotive building in the interests of an Eastern syndicate. He thus comes to his new position rarely well equipped, and will be warmly welcomed back to railroad work.

ELECTIONS AND APPOINTMENTS.

Alleghany & Kinzua.—M. D. Murray has been appointed Superintendent, with office at Bradford, Pa., to succeed C. V. Merrick.

Atlantic Short Line.—The following directors were elected at a recent stockholders' meeting in Savannah: John R. Young, W. W. Williamson and S. Meinhard, of Savannah; W. L. Strong, Henry Rice and S. Stein, of New York; J. F. Hanson, of Macon, and I. L. McKee, of Memphis. Walter C. Hartridge was elected Secretary of the board.

Blue Ridge.—H. C. Beattie is Receiver of this company, with office at Anderson, S. C.

Brooklyn Union Elevated.—The stockholders held their annual meeting last week and elected these Directors: Adolph Ladenburg, Edward Lauterbach, Leonard Lewisohn, Simon Rothschild, Jacob Scholla, Henry Seidenberg, Elbert Snedeker, Simon Uhlman, Frederick Uhlman, George W. Wingate, Elisha Dyer, Jr., William Pond, Jr., Emil Schaeffer, Jr. Austin Corbin, Anthony Barrett, and Albert L. Drake were not re-elected Directors. The new Directors organized by electing Frederick Uhlman, President, in place of Adolph Ladenburg; George W. Wingate, Vice-President, in place of Anthony Barrett; Elisha Dyer, Jr., Secretary and Treasurer, in place of Albert Snedeker.

Central of Georgia.—The annual election for the Directors for the company was held on Jan. 7. The old board was re-elected as follows: H. M. Comer, Abraham Velsburg, George J. Mills, J. B. Holts, J. B. Hull, Henry R. Jackson, C. R Phinizy, Evan P. Howell, U. B. Harold, S. R. Jacquez, James Swann and S. W. Tilson. The 42,000 shares owned by the Southern were not voted, but the old board is friendly to the Southern interests.

Chester, Perryville, Ste. Genevieve & Farmington—L. B. Houck is President and General Manager of this road, operating about 25 miles in Missouri, and E. F. Blomeyer is Secretary and General Freight and Passenger Agent, with headquarters at Cape Girardeau, Mo.

Cincinnati, Portsmouth & Virginia.—James G. Leiper has been elected Vice-President.

Chicago & Northwestern.—C. A. Cairns has been appointed Assistant General Passenger ... ...cket Agent of this company.

Elgin, Joliet & Eastern.—J. F. Sechler having resigned, John Harrigan has been appointed Master Mechanic, and E. T. Carlton Master Car Builder, with office at Joliet, Ill.

Farmville & Powhattan.—N. V. Randolph has been elected President, to succeed Joseph Hobson, resigned.

Fitchburg.—The position of Traveling Freight Agent on the tunnel division has been abolished and A. C. Lorion, who filled the place, has been promoted to division Freight Agent, with headquarters at Fitchburg, Mass. This is a new office.

Glenn Springs.—H. S. Simpson is President of this road built in 1894, with office at Glenn Springs, S. C.

Jacksonville, Tampa & Key West.—W. B. Coffin, General Superintendent, in addition to his other duties, has been appointed Purchasing Agent of the Jacksonville, Tampa & Key West road, in place of J. H. Bland, resigned.

Louisville, St. Louis & Texas.—Edgar Hill has been appointed Traffic Manager with headquarters at Louisville, Ky.

New York, Lake Erie & Western.—W. Lavery has been appointed Assistant Superintendent of Motive Power of the New York, Pennsylvania & Ohio Division, with office at Cleveland O., to succeed S. Higgins.

N. Y. & Long Island Bridge Co.—At a special meeting of the stockholders of the company at 192 Broadway, New York City, on Jan. 7, the following Directors were elected to hold office until next June: William J. Kelley, William G. Bosworth, Joseph H. Jones, George A. Hamilton, Henry M. Conover, Edward J. Boyle, James J. Noonan, James G. Gardner, George W. Quinlan, Jacob P. Miller, Daniel M. Rollins and Herbert C. Smythe.

Northern Pacific.—Frank A. Gross, for several years agent of the New York Central & Hudson River road at Utica, has been appointed District Passenger Agent of the road with headquarters in Boston.

Ohio & Charleston.—J. J. Collier is Secretary and Treasurer of this company, with headquarters at 310, Chestnut street, Philadelphia, H. J. Bruce is Auditor, with office at Blacksburg, S. C.

Ohio Southern.—W. K. Kearsley has been appointed Assistant Auditor with headquarters at Springfield, O., to succeed F. M. Crook, resigned.

Peoria, Decatur & Evansville.—R. H. Starbuck has been appointed car accountant, with headquarters at Mattoon, Ill.

Pittsburg, Akron & Western.—A. S. Miller has been appointed Acting General Freight and Passenger Agent, with office at Akron, O., to succeed W. S. Taylor, resigned.

Poughkeepsie & Eastern.—The title of W. H. Sheldon has been changed from General Superintendent to General Manager.

Providence & Stonington Steamship Co.—J. N. Babcock having resigned as Assistant General Passenger Agent, William DeWolf Dimock has been appointed to succeed him, with office at Pier (new) 36, North River, New York.

Southern.—J. Turner has been appointed trainmaster, with headquarters at Raleigh, N. C. Mr. Turner takes the place of W. F. Williams, resigned.

Terre Haute & Indianapolis.—The annual meeting of the stockholders of this road, the lessor of the Vandalia, was held on Jan. 7. The three Vice-Presidents of the Pennsylvania Company—Messrs. McCrea, Brooks, and Davidson, were elected Directors. Mr. McKeen was re-elected President, and John G. Williams continues as General Manager and Chairman of the Executive Committee, which makes him the executive head of the system.

Wagner Palace Car Co.—R. A. Wilson has been appointed District Superintendent at Kansas City, Mo., to succeed R. A. Forsyth.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Adirondack.—The State Land Board, of New York, has refused the application of the Adirondack Railroad for permission to extend its line from North Creek to Long Lake, N. Y., in the Adirondacks, a distance of thirty miles. There was much opposition to the Board granting the application of the railroad for authority to build the extension. Some of the opponents secured an injunction from the courts to prevent the Board giving the desired authority. They finally acted on the last day when they had any power to do so as the new State constitution forbids the construction of a railroad through the mountains.

Ashland Terminal.—At the recent annual meeting of the Company it was decided to build 18 miles of railroad this spring. The officers elected are as follows: J. W. Cochran, President; Thos. Bardon, Treasurer and Manager; R. C. Heydlauff, Secretary. The surveys have been made, some right of way has been secured, and it is intended to have the work well under way by April next.

Brookline & Milford.—There promises to be a contest in the Maine Legislature over the application for a charter for a new railroad extending form Milford to Manchester, N. H. The road will be an extension of the Brookline & Milford controlled by the Fitchburg and which recently was built between Brookline and Milford. The fight is between the Fitchburg on one side and the Boston & Maine and Concord & Montreal on the other.

Central Counties.—The construction of this railroad from South Indian to Rockland, Ont., about 20 miles will be completed this week.

Central Louisiana.—This company was recently organized at Rayne, La., to construct a road from Vermilion Bay through the center of Vermillion Parish, Lafeyette Parish, to Rayne, thence to Church Point and Flattown in the Parish of St. Landry, thence to Chicot, and to some point on the Texas and Pacific near Cheyneville or Alexandria, a distance altogether of 70 miles. The greater part of the road is through prairie except where it crosses the streams, which are very small, the only timber to cut being on each side of the streams. Wellman Bradford, of Rayne, La., is Chief Engineer.

Charleston, Clendinnin & Sutton.—The locating engineers, under Col. J. H. Romine, have completed the survey of one of the routes between Clendennin and Sutton, W. Va. This location is along the south side of the Elk River all the way, and is a very satisfactory route. There are no heavy grades, and no cuts to be made. From Big Laurel to Clay Court House another location will be made in the hope of getting a still easier route between those two points. In either case, it will be necessary to bridge the river once. The construction on this line has been kept up uninterruptedly since last October, till a few days ago, when the work was suspended on account of the severe weather. The grading is half done to Clay Court House.

Chicago & Carbondale.—Articles of incorporation were filed with the Secretary of State at Springfield last week by this new railroad company. It proposes to build a road form a point on the Chicago, Paducah & Memphs Railroad, in the county of Williamson, to a point connecting with the Chicago & Texas Railroad, in Carbondale, Jackson County, with branch lines into the coal fields of both counties. The capital stock is $300,000, and the principal office is to be at East St. Louis. The incorporators are: William L. Huse, St. Louis; John J. McLean, Hillsboro; John W. Griswold and James H. Atterbury, Litchfield; A. G. Brown, St. Elmo; W. S. Carter, St. Louis, and Rodney Kelly, St. Elmo.

Ellaville, Westlake & Jennings.—This road is now completed through Hamilton County, in the northern part of Florida, from Ellaville north to Withlacoochee Bridge, Horne, Grover and Westlake, 11 miles altogether. The route has been surveyed to Jenning's, nine miles north of Westlake and just south of the Georgia state line. The contracts have been let to West Bros, who have sublet the work. The grading is not difficult, the country being very level and requires but very little excavating or fills. The officers of the company are: J. W. West, President; E. E. West, General Manager; W. J. Kelly, Secretary and Treasurer, and G. J. Swet, Chief Engineer, all of Ellaville, Fla.

Georgia Northern.—J. N. Pidcock, Jr., Frank R. and John F. Pidcock, all of Jersey City, N. J.; O. L. Davis, of Moultrie, and James N. Pidcock, of White House, N. J., are among the incorporators of the Georgia Northern, projected from Pidcock, in Brooks County, into Berrien County, Ga.

Georgetown & Granger.—Messrs. Allison and Morris have the contract for grading the five miles of the railroad to Granger, Tex., have teams at work five miles west of that town, and will rapidly push the work through to Granger. Grading and bridging between Granger and Georgetown is to be completed by Feb. 15, about half the work only being a new grade. The line is 16 miles long and was partly graded some years ago.

Gulf, Beaumont & Kansas City.—The company has begun to lay rails on the 18-mile extension from Buna, Tex. north to Kirby, and the work will be pushed rapidly until completed. E. E. Pratt of Boston, Mass., President of the line, is expected in Beaumont, Tex., the company's headquarters, in a few days, Vice-President J. H. Kirby, who has been in the east for some months, returning with him.

Gulf, Colorado & Santa Fe.—General Manager Yokum, speaking of the widely published rumor that the company contemplated an extension from Fort Worth into Jack County, Tex., says that there is no truth in the rumor.

Long Island.—Work on the extension from Easthampton to Amagansett will be commenced in a few days. The road is to be finished by April 1. The section between Bridgehampton and Easthampton is progressing rapidly.

Louisiana & Northwest.—It is stated that J. D. Beardsley has purchased a controlling interest in the road, and will extend it to a connection with the St. Louis, Iron Mountain & Southern, at Hope, Ark The Louisiana & Northwest is 40 miles long, extending from Homer to Bienville, La.

Madison County Belt.—This company organized to encircle Alexandria, Ind., and contiguous towns with a railroad, was chartered at Indianapolis Ind. Jan. 3 with a capital of $150,000. The incorporators are the directors and officers of the Union Steel Co. of Alexandria.

Mahoning State Line.—The Pittsburg & Lake Erie road has opened for traffic a freight line known as the Mahoning State Line road, Lowellville Junction, O., on the main line, to Hilltown, Pa. eight miles distant. This branch has been building for some time. No passenger service has been attempted yet. The branch reaches large stone quarries, from which a heavy business is expected.

Mexican Roads.—The Mexican Government has granted a concession to a syndicate of New York capitalists for building a railroad from the Batopilas mining district to a point on the Mexican Central Railroad, a distance of about 200 miles. Ex-Gov. Alexander Shepard, a leading mine owner of the Batopilas district, is the leading member of the syndicate.

Monongahela River.—Reports have been telegraphed over the country within the past two weeks, from Uniontown, Pa., to the effect that this road, and the West Virginia & Pittsburg road, which is an extension of 100 miles from Clarksburg, W. Va., into the interior of that State, had been sold to the Baltimore & Ohio. Hon. H. G. Bowles President of the company, and other stockholders deny the truth of the report. There has been no sale, and no such sale is contemplated.

National Tehauntepec.—It is announced that the Mexican Government has rejected the proposal of C. P. Huntington to operate this line. The business of the railroad is increasing rapidly, and the Federal Government has found it a profitable line. There will be several important branches constructed the present year, including one to Pazoz del Rio de San Juan, State of Vera Cruz.

New Roads.—Engineer J. T. Williams, of Denver, has completed the survey of a railroad from Flagstaff, Ariz., to the nearest point of the Grand Canon of the Colorado, 35 miles away.

Ottawa, Arnprior & Parry Sound.—A final inspection of four ten-mile sections of this railroad to Long Lake, Ont., was made by Government engineers last week. There remains but 60 miles west of Long Lake to Emsdale, Ont., yet to be constructed to finish the line through from Ottawa to the waters of Georgian Bay. The construction of the entire road has been under the charge of G. A. Mountain.

Paducah, Cairo & Western.—This railroad company, recently organized, is projected to extend from Paducah, Ky., via Moxins Mills, Woodville and Hazzelwood, to East Cairo, Ky., 33 miles. The surveys have been completed and the prospects for construction early in spring are very favorable. The contracts will probably be let about April 1. The work will average 20,000 cu. yds. of earth per mile. The maximum grade is 52.8 ft. per mile, compensated on curves and the maximum curves 3 degrees. The officers are: W. J. Hills, Paducah, Ky., President; Geo. O. Hart, Paducah, Vice-President; A. J. Welsh, Memhpis, Tenn., Secretary, and N. R. Olcott, Paducah, Chief Engineer.

Pennsylvania.—The survey for a branch of the road into the northern section of Somerset County, Pa., has been finished. It is said to be the intention of the Pennsylvania to anticipate the Pennsylvania Midland by the immediate building of a circular line that will extend from Lovett, on the South Fork branch, to Scalp Level, thence to Port Creek, and join the Somerset & Columbia road at Foustwell. The branch will then be extended up Shade Creek and back to Dunlo, Cambria County, to join the South Fork branch again.